Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB.

Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS
MERRITT LYNDON FERNALD
HOLLIS WEBSTER
} Associate Editors.

WILLIAM PENN RICH
EDWARD LOTHROP RAND
} Publication Committee.

VOLUME 11.

1909.

Boston, Mass.
1052 Exchange Building.

Providence, R. I.
Preston and Rounds Co.

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB.

Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS
MERRITT LYNDON FERNALD } Associate Editors.
HOLLIS WEBSTER

WILLIAM PENN RICH
EDWARD LOTHROP RAND } Publication Committee.

Vol. 11. **January, 1909.** **No. 121.**

CONTENTS:

Representatives of Potentilla Anserina in Eastern America. *M. L. Fernald* 1
Salix subsericea, a distinct Species. *F. F. Forbes* 9
Some interesting Maine Plants. *J. A. Cushman* 12
A new hybrid Violet. *F. F. Forbes* 14
The Bryophytes of Connecticut (Review). *J. F. Collins* . . . 15

Boston, Mass.
1052 Exchange Building.

Providence, R. I.
Preston and Rounds Co.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price $1.00 per year ($1.25 to all foreign countries including Canada); single copies 15 cents. Volume 1, $2.00, Vol. 2, $1.50. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

B. L. ROBINSON, Clement Circle, Cambridge, Mass.

Subscriptions, advertisements, and business communications to

W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

Single copies may be had from

E. L. RAND, Corresponding Sec'y N. E. Botanical Club,

1052 Exchange Building, Boston, Mass.

Entered at Boston, Mass., Post office as Second Class Mail Matter

SYNOPTICAL FLORA OF NORTH AMERICA, by A. GRAY and others. Vol. I. Fascicles 1 and 2. A critical treatment of forty-five families of polypetalæ (*Ranunculaceæ to Polygalaceæ*) 1895-1897. $5.20.—GRAY HERBARIUM of Harvard University, Cambridge, Mass.

NEW ENGLAND WILD FLOWERS AND THEIR SEASONS, by WILLIAM WHITMAN BAILEY. Price 75 cents net.—PRESTON & ROUNDS CO., Providence, R. I.

NOTICE

On and after April 1, 1907, the price of Volume 1, (1899) of RHODORA will be $2.00, and Volume 2, $1.50.

Complete sets of these two volumes are in very limited supply and will soon be exhausted. Volumes 3 to 8 can still be supplied at $1.00 each, unbound.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collectors' memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3–4 in. *1 year $4.00, 6 months $2.50.*

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 11. January, 1909. No. 121.

THE REPRESENTATIVES OF POTENTILLA ANSERINA IN EASTERN AMERICA.

M. L. Fernald.

Botanists who have collected both in northern New England and on our seacoast have long realized that the Silverweeds of these two regions are far from identical; but, owing to the confusion which has prevailed in regard to the identity of the many described variations of the species, the question has been left until the plants could be treated by a monographer. In November, 1908, two extensive monographs of *Potentilla* appeared, but when one turns to these two treatments with the hope of settling his long-standing problems the results are certainly disheartening. Wolf,[1] following the conservative practice of many generations, maintains *Potentilla Anserina* as a *Potentilla* of world-wide distribution, of which he recognizes eight leading varieties and numerous forms. Rydberg,[2] on the other hand, treats the Silverweeds as a genus, *Argentina,* with eight North American species. It is, then, not surprising that the novice in this group finds himself perplexed to label with an approximation to truth the material in his herbarium.

After spending some days in the study of the material in the Gray Herbarium and the Herbarium of the New England Botanical Club, the writer finds that, as the plants appear to him, they fall into two definite and recognizable groups. These two pronounced tendencies, happily, are the same as those indicated by Wolf for the primary grouping of the varieties, and by Rydberg for the chief groups of his species; but, working independently, each author seems to have

[1] Theodor Wolf, Monographie der Gattung Potentilla, in Bibliotheca Botanica, xvi. pp. 1–714, Stuttgart (1908).

[2] Rydberg, Rosaceae (pars), in North American Flora, xxii. pt. 4, pp. 293–376, New York Botanical Garden (1908).

overlooked an important character which is emphasized by the other. Wolf's key to the varieties of *Potentilla Anserina* is as follows.

"I. Folia subtus plus minusve dense (raro parcissime) pilis longis adpressis tomentum verum obtegentibus argenteo-sericea, nitentia; sepala externa plerumque 3–plurifida, raro integra.

A. Caules, petioli, rhaches foliorum pedunculique pilis a c c u m b e n t i b u s vel saltem valde a r r e c t i s vestiti, quandoque glabrescentes.

1. Folia subtus dense argenteo-sericea vel saltem albicantia aut cinerascentia.

a. Planta tota (praeter paginam inferiorem foliorum dense pilosam) modice vel parce pilosa, virescens vel subcanescenti-viridis. *v. vulgaris.*

b. Planta tota (etiam super paginam superiorem foliorum) dense argenteo-sericea, nitens . . . . . . *v. sericea.*

2. Folia subtus viridia, sicut planta tota parce pilosa vel subglabra. *v. nuda.*

B. Caules, petioli, rhaches foliorum pedunculique pilis s u b h o r i z o n t a l i t e r p a t e n t i b u s vestiti, hirsuti; foliola subtus adpresse sericeo-pilosi.

1. Foliola sessilia l neari-oblonga vel obovato-oblonga, basi longiuscule cuneata . . . . *v. hirsuta.*

2. Foliola conspicue (terminale longe) petiolulata suborbiculata vel rotundato-obovata, basi contracta vel brevissime cuneata. *v. maoria.*

II. Folia subtus aut glaberrima, aut tomento vero niveo obtecta, non nitentia vel super nervos pilis brevibus sericeis micantia (praevalente semper tomento opaco); sepala externa fere semper integerrima, rarissime 2–3 fida.

A. Folia et sepala subtus tomentosa, reliquae plantae partes aut modice pilosae, aut subglabrae.

1. Planta robusta foliis maximis usque 30 cm. et ultra longis multijugis, foliolis superioribus 3–6 cm. longis; tomentum foliorum intermixtis pilis sericeis brevibus micans . . *v. grandis.*

2. Planta mediocris vel parva foliis 3–6 (–10) cm. longis 3–5 (–7) jugis, foliolis superioribus 1–2 cm. longis, tomentum foliorum omnino opacum, ad summum quandoque secus nervos pilis sericeis paucis submicans . . . . *v. groenlandica.*

B. Folia et sepala utrinque glaberrima, sicut plerumque reliquae quoque plantae partes. (Cfr. etiam *v. nudam.*) . . . . *v. Egedii.*"[1]

Rydberg's division of *Argentina* is

[1] Wolf, l. c. 672.

"Achenes corky with a deep groove; stems, petioles, and rachis of the leaves densely pubescent, with at first ascending and later spreading hairs.

Leaves silvery on both sides. 1. *A. argentea.*

Leaves green and glabrate above. 2. *A. Anserina.*

Achenes not corky, without a groove; stem, petioles, and the rachis of the leaves glabrous or slightly appressed-hairy and glabrate.

Petals usually over 1 cm. long, rounded-obovate.

Bractlets lanceolate, longer than the sepals; leaves usually 3–4 dm. long. 3. *A. pacifica.*

Bractlets elliptic or oblong, shorter than the sepals; leaves 1–2 dm. long. 4. *A. occidentalis.*

Petals 6–8 mm., rarely 1 cm. long, usually elliptic-obovate.

Leaflets elliptic-obovate to oblanceolate, many-toothed, silky as well as tomentose beneath; bractlets nearly equaling the sepals or even exceeding them.

Upper leaflets rounded at the apex, with more than 20 linear-lanceolate teeth; petals elliptic, about 6 mm. long; pistils few. 5. *A. Babcockiana.*

Upper leaflets acute or obtuse at the apex, with less than 20 triangular-lanceolate or ovate-lanceolate teeth.

Hypanthium acute at the base; bractlets linear-lanceolate; rachis of the leaves appressed-pubescent. (Western species.) 6. *A. subarctica.*

Hypanthium obtuse at the base; bractlets broadly lanceolate; rachis of the leaves glabrate or nearly so. (Eastern species.) 7. *A. litoralis.*

Leaflets broadly obovate, 0.5–1 cm. long, few-toothed, usually tomentulose beneath but silky only on the veins; bractlets linear or lanceolate, much shorter than the sepals. 8. *A. Egedii.*"[1]

As stated, the writer finds in studying the American material that the characters of the two leading groups in these two treatments are very constant. The achene-characters described by Rydberg are beautifully clear in all the fruiting material examined, and, associated as they are with the peculiarity of pubescence brought out more definitely in Wolf's descriptions of his primary groups, indicate that the plants of the two groups are scarcely to be considered varieties of one species. This view is further strengthened by the fact that the varieties of Wolf's first group are all Old World or circumpolar plants, while those of the second group are essentially confined to North America and adjacent eastern Asia.

Potentilla Anserina (including var. *vulgaris*), the circumpolar

[1] Rydb. l. c. 352, 353.

species, has the achenes corky and plump, with a groove in the back so that the achene appears slightly 2-ridged; its peduncles, stolons, and rhachises are usually very pubescent; the young foliage is lustrous beneath; and the bractlets of the calyx, though sometimes entire, are commonly toothed or lobed. This plant is abundant on gravelly shores of the Gulf of St. Lawrence, of the St. John River and its tributaries in Maine and New Brunswick, of Lake Champlain, and of many rivers and lakes of the interior; and it follows at low levels along the mountains from Alaska to New Mexico and southern California. It is also occasionally introduced southward on ballast and transported gravel.

The writer has sought in vain for constant characters to separate Rydberg's *Argentina argentea* from his *A. Anserina.* The key-character given by Dr. Rydberg is that the former has the "leaves silvery on both sides," the latter the "leaves green and glabrate above." Careful scrutiny of the diagnoses which describe the characters in one plant but fail to bring out their contrasts with parallel characters of the other,[1] shows no difference (except the pubescence) which might not

[1] *A. argentea*	*A. Anserina.*
"Stolons 1–5 dm. long, white-silky with ascending or spreading hairs."	"Main stem almost none, from a cluster of fascicled roots and producing numerous runners 3–6 dm. long."
"Basal leaves 1–2 dm. long, pinnate, with 11–25 larger leaflets and smaller ones interposed; rachis with long white, at first ascending, soon spreading hairs."	"Leaves 1–2 dm. long, interruptedly pinnate, with 9–31 larger leaflets and smaller interposed, in the typical form spreading or flat on the ground, slightly silky and green above, white-silky and tomentose beneath."
"Larger leaflets 1–3 cm. long, obovate, rounded at the apex, serrate with 7–20 ovate or ovate-lanceolate teeth, white-silky on both sides or a little greener above, the smaller ones less than 1 cm. long and few-toothed."	"Larger leaflets 1–4 cm. long, oblong or oblanceolate, usually acute, deeply and sharply serrate with linear-lanceolate teeth in the European and eastern American form, more obovate, rounded at the apex and with broader ovate or triangular teeth in the Rocky Mountain form."
"Pedicels 2–7 cm. long, white-silky."	"Flowers 1–2 cm. in diameter, on pedicels 3–10 cm. long."
"Hypanthium and calyx white-silky, the former 5–8 mm. wide."	
"Bractlets oblong or elliptic, 4–6 mm. long, usually entire, about equaling the ovate or ovate-lanceolate sepals."	"Bractlets simple and lanceolate, or often broader, ovate-lanceolate, toothed or divided, generally a little longer than the broadly ovate sepals."
"Petals obovate or broadly oval, 6–9 mm. long."	"Petals oval, 7–10 mm. long."
"Achenes 2 mm. long, brown, obliquely obovate, corky, with a deep groove."	"Achenes numerous, corky, very thick, grooved at the upper end."

be expected from a single package of seed planted in different corners of a garden. The leaflets of *A. argentea* are said to be obovate, while those of *A. Anserina* are described as oblong, oblanceolate, or obovate. A sheet of the St. John Valley plant with the leaflets conspicuously silvery-silky above and labeled by its collector *Potentilla Anserina*, var. *concolor* is in the Gray Herbarium, but in spite of its leaves being "silvery on both sides" it was relabeled by Dr. Rydberg in 1908 "*Argentina Anserina* (L.) Rydb." Other specimens in the Gray Herbarium marked by Dr. Rydberg as his *A. argentea* have the leaflets of the most typical oblong outline. As to the persistence of the silvery-sericeous pubescence on the upper surfaces of the leaflets, this ecological character is very marked in extreme plants, but in other less pronounced colonies some of the leaves are sericeous above, while others are quite green and glabrous. Such a specimen in the Gray Herbarium collected by Engelmann on the Laramie River shows this inconstancy of the pubescence; nevertheless it was marked without question by Dr. Rydberg as "var. *concolor*" (prior to his raising that variety to specific rank as *A. argentea*). At best, then, *A. argentea* is to be treated as an ecological variant of *Potentilla Anserina*, characterized by the silvery-sericeous pubescence which normally covers both sides of the leaves. This rather pronounced extreme of *P. Anserina* has long been called var. *concolor* Seringe,[1] although the name was earlier assigned to it by Wallroth;[2] but Wolf draws attention to the fact that, prior to the publication of var. *concolor* by Wallroth, the plant had been described by Hayne as *P. Anserina*, "*β. sericea* foliis utrinque sericeis."[3] The plant, then, which is abundant in the Northwest and extends in less pronounced form eastward to the St. John River, Maine, and the Gulf of St. Lawrence, should be called *Potentilla Anserina*, var. *sericea* Hayne.

Of the other plants designated by Wolf under his first division none (except var. *vulgaris* which is typical *P. Anserina*) is known in America. Var. *nuda* seems to be strictly European; var. *hirsuta* is known only from Asia; and var. *maoria* (*P. anserinoides* Raoul; *P. Anserina*, var. *anserinoides* Hook. f.), which has stronger claims to specific rank than are recognized by Wolf,[4] is a unique plant of the New Zealand region.

[1] Ser. in DC. Prodr. ii. 582 (1825).
[2] Wallr. Sched. Crit. i. 236 (1822).
[3] Hayne, Arzneigew, iv. 31 (1816) according to Wolf, l. c. 672, 673.
[4] *P. anserinoides* Raoul, besides having petiolulate leaflets, differs from *P. Anserina* in its comparatively thin laterally compressed achenes which are not dorsally grooved.

Of the plants enumerated by Wolf and by Rydberg under their second main groups, *Potentilla Egedii* Wormsk. (*P. Anserina,* var. *Egedii* T. & G., *Argentina Egedii* Rydb.) seems to stand off from the others by the pinnate (scarcely interruptedly pinnate) leaves, and the few comparatively broad leaflets which are glabrous or glabrate beneath. The writer has been unable to see good achenes of this plant, but they are said by Rydberg to be "2.5 mm. long, plump, not grooved." *P. Egedii* is an arctic plant seemingly distinct from *P. Anserina* and extending down our coast to northern Labrador.

The other species maintained by Rydberg are open to greater doubt. In the first place, the chief distinction of his species nos. 3 and 4 as contrasted with the remainder is, that in the first two species the petals are "usually over 1 cm. long, rounded-obovate"; while in the others the petals are said to be "6–8 mm., rarely 1 cm. long, usually elliptic-obovate." Under the group with petals "over 1 cm. long" are *Argentina pacifica* and *A. occidentalis,* which in the seventeen sheets at hand show petals varying from 1–1.3 cm. long, with outlines from elliptic-oblong to broadly obovate. In the eastern plant called *A. litoralis* the fifteen sheets before the writer show elliptic to obovate petals 1–1.3 cm. long; not one of them *less* than 1. cm. in length. This is the common salt marsh plant of New England and eastern Canada, and one cannot refrain from expressing regret that Dr. Rydberg has never known the full beauty of its large flowers. This fundamental distinction of size of petals is, then, a character which is not shown by abundant specimens. Whether *A. occidentalis* is separable from *A. pacifica* is not one of the chief questions of this paper, but it is worth recording that the specimen of Baker's no. 3217 (the type number of *A. occidentalis*) in the Gray Herbarium is unlike the description given by Rydberg in having lanceolate bractlets which are quite as long as the sepals, thus answering more nearly the key character of *A. pacifica.*

Of *Argentina Babcockiana,* described from Westminster Park and from the shores of Oneida Lake, New York, the writer has no knowledge; but with *A. litoralis,* the common species "along the coast and in salt marshes, from Labrador, Newfoundland, and Quebec to Long Island," he has long been familiar. This salt marsh plant is clearly distinct from *Potentilla Anserina* of the gravel beaches of the St. Lawrence, the St. John, and Lake Champlain, in the dull white tomentum of its leaves; the glabrous or early glabrate peduncles, stolons, and

rhachises; and the laterally compressed round-backed, not furrowed, achenes. That it merits specific recognition there can be no question, but prolonged study has failed to show that it differs in constant or even apparent characters from *Potentilla pacifica* Howell [1] (*P. Anserina*, var. *grandis* T. & G., *Argentina pacifica* Rydberg). In all essential characters — pubescence, bractlets, petals, achenes, etc., — the plant of the Atlantic salt marshes is like that of the Pacific coast, though Rydberg's descriptions make it differ in its smaller flowers (see above) and its more obovate or oval leaflets. In the outline of the leaflets *P. pacifica* shows considerable variation, and many of the northwestern specimens cannot be distinguished by this character from the plant of the Atlantic coast. There seems to be no reason, then, why the two plants should be kept apart by the artificial character set up for them. It is interesting to find, as our knowledge of temperate floras should lead us to expect, that *P. pacifica* extends by way of the Aleutian Islands to the coast of eastern Asia and south to Japan,[2] a fact already brought out by Wolf, who, although overlooking the important achene-character of the plant and therefore treating it as *P. Anserina*, var. *grandis*, states its range as the Pacific and Atlantic coasts of America and the east coast of Asia.[3]

As *Potentilla pacifica* approaches the northern limit of its range it becomes dwarfed and its leaflets are rapidly reduced in number until, in northern Labrador, Greenland, arctic Alaska, and northeastern Siberia, it often has only 7–15 small leaflets. This dwarfed arctic and subarctic extreme is *P. Anserina*, var. *groenlandica* Tratt., but, so far as the material at hand shows, it is to be considered a dwarfed phase of *P. pacifica* rather than a true variety. On the coast of New England and eastern Canada, Dr. Rydberg's *P. litoralis*, which is said to have the "leaves 1–3 dm. long," with the "upper leaflet 2–3 cm. long," becomes dwarfed under adverse conditions and has leaves barely 3 cm. long, with as few as 13 leaflets, the terminal 7 mm. long,

[1] Howell, Fl. N. W. Am. i. 179 (1898).

[2] These plants which occur in Eastern North America and in northeastern Asia but not in Europe make a considerable portion of our flora — one hundred or more species; *Onoclea sensibilis, Cypripedium arietinum, Habenaria bracteata, Polygonum arifolium, P. sagittatum* and *P. scandens, Geum strictum, Phryma Leptostachya*, &c. Several such plants are associated in salt marshes or brackish soil on both the Atlantic and Pacific coasts with *Potentilla pacifica*; for example, *Poa eminens, Glaux maritima*, var. *obtusifolia*, and *Gentiana Amarella*, var. *acuta*.

[3] See Wolf, l. c. 676.

while luxuriant plants have leaves 4.3 dm. long, the terminal leaflet 5.5 cm. in length. *Argentina subarctica* Rydberg, judging from specimens in the Gray Herbarium named by Dr. Rydberg, is transitional between well developed *Potentilla pacifica* and its most dwarfed state.

As interpreted by the writer the members of this group in eastern America should be classified as follows.

* Achene thick-ovoid to subglobose, more or less corky, dorsally sulcate: stolons, peduncles, petioles, and rhachises more or less pubescent with ascending or loosely spreading hairs: leaflets silvery-silky beneath, at least the younger lustrous.

P. ANSERINA L. Leaflets green and glabrous or glabrate above: bractlets often cleft.— Sp. 495 (1753). *P. Argentina* Huds. Fl. Ang. 195 (1762). *Argentina vulgaris* Lam. Fl. Fr. iii. 119 (1778). *P. Anserina α vulgaris* Hayne, Arzneigew. iv. 31 (1816) according to Wolf, Mon. Pot. 672 (1908). *P. Anserina α discolor* Wallr. Sched. Crit. i. 236 (1822). *Argentina Anserina* Rydb. Mem. Dept. Bot. Columbia Univ. ii. 159 (1898).— Widely distributed in northern regions. In America extending south, chiefly in gravelly or sandy soil, to Prince Edward Island, the St. John Valley of New Brunswick and Maine, Lake Champlain, western New York, northern Indiana, central Illinois, Iowa, New Mexico, and southern California.

Var. SERICEA Hayne. Leaflets silvery-sericeous on both surfaces. — Arzneigew. iv. 31 (1816) according to Wolf, Mon. Pot. 672, 673 (1908). *P. Anserina β. concolor* Wallr. Sched. Crit. i. 236 (1822). *P. Anserina β. holosericea* Gaudin, Fl. Helvet. iii. 406 (1828). *P. Anserina, α argentea* Neilr. Fl. N. Österr. 908 (1859). *P. Anserina α. unicolor* Schur, En. pl. Transs. 189 (1866). *P. sericea* Zimmeter, Eur. Art Pot. 6 (1884), acc. to Wolf. *P. concolor* Zimmeter, Bot. Kal. 66 (1887) acc. to Wolf. *Argentina Anserina concolor* Rydb. Mem. Dept. Bot. Columbia Univ. ii. 160 (1898). *A. argentea* Rydb. Bull. Torr. Bot. Cl. xx. iii. 143 (1906).— Of similar distribution; in the eastern states and Canada often growing with or near the typical form of the species; in the more arid regions of North America generally with thickish leaves.

* * Achene laterally compressed, firm, rounded on the back, not sulcate: stolons, peduncles, petioles, and rhachises glabrous or glabrate: leaflets white-tomentose beneath with opaque hairs (slightly if at all sericeous) or glabrate.

+ Calyx and lower surfaces of the interruptedly pinnate leaves white-tomentose.

P. PACIFICA Howell. Leaves 0.3–5 dm. long, with 7–31 oblong, oblanceolate, or obovate leaflets: bractlets usually simple.— Fl. N. W. Am. i. 179 (1898). *P. Anserina groenlandica* Tratt. Ros. Monog.

iv. 13 (1824). *P. Anserina, β. grandis* T. & G. Fl. i. 444 (1840). *Argentina Egedii* Rydb. Mem. Dept. Bot. Columbia Univ. ii. 158 (1898) in part. *A. Anserina grandis* Rydb. l. c. 161 (1898). *A. pacifica* Rydb. in N. A. Fl. xxii pt. 4, 353 (1908). *A. litoralis* Rydb. l. c. 354 (1908). *A. subarctica* Rydb. l. c. 354 (1908).— From Greenland to northeastern Siberia, extending southward, in damp brackish or saline soils, chiefly near the coast to Long Island, New York, California, and Japan; in arctic and subarctic situations and in unfavorable conditions southward becoming very small.

+ + Calyx and lower surfaces of the simply pinnate leaves glabrous or glabrate.

P. Egedii Wormsk. Fl. Dan. ix. fasc. 27, 5. t. 1578 (18 8). *P. Anserina, δ Egedii* T. & G. Fl. i. 444 (1840). *P. Anserina,* var. *concolor* Lange, Consp. Fl. Groenl. 234 (1887) not Wallr. *Argentina Egedii* Rydb. Mem. Dept. Bot. Columbia Univ. ii. 158 (1898) in part. — Arctic regions, extending south on our coast to northern Labrador.

Gray Herbarium.

SALIX SUBSERICEA A DISTINCT SPECIES.

F. F. Forbes.

For the past two seasons the writer has been much puzzled by a willow the characters of which do not agree with any description given in the current manuals. This willow is rather common in the vicinity of Boston, growing in wet places where willows usually thrive. The writer has collected it in different locations in Dedham, West Roxbury, and Arlington. Leaf-specimens collected in western Massachusetts and in southern New York indicate that it has quite a wide range.

It was at first suspected that the willow in question might be a hybrid between *Salix cordata* Muhl. and *S. sericea* Marsh., but study of numerous specimens from many different shrubs shows that it cannot be a hybrid. As far as the writer's observations go, willows which are hybrids between two definite species do not present constant characters. One shrub may have the fruit more like that of one parent and the leaves more like those of the other; or the shrubs may be quite intermediate in most respects; but no two of them are alike.

The willow under consideration, however, is fully as constant in its characters as *Salix cordata* Muhl., while it is clearly separated from its near relatives, *S. petiolaris* Sm. and *S. sericea* Marsh. The leaves, which resemble those of *S. cordata* much more than those of *S. petiolaris* or *S. sericea* and remain green or blacken but slightly in drying, have beneath and usually on the midvein above a permanent pubescence, which is not so dense or silky as that of *S. sericea.* The small glandular-toothed stipules are a little less deciduous than those of *S. sericea* and *S. petiolaris*, some of them usually being present at the end of the season. The leaves and branches make a greater angle with the twigs and main trunks respectively than do those of the two latter species and give the shrub a somewhat zigzag appearance in the field. The aments and capsules are best described by saying that they are quite intermediate between those of *S. petiolaris* and *S. sericea.* In the former species the aments (at least when young) are leafy-bracted at base and in maturity appear loose from the lengthening of the pedicels; the oblong-spatulate scales are brown to yellowish; and the long-beaked capsules (6.5–8 mm. long) are on pedicels which usually much exceed the scales. In *S. sericea* the dense aments are slightly if at all bracted at base, the short oblong scales are blackish, and the round-tipped capsule (2.5–4.5 mm. long) is on a pedicel which about equals or only slightly exceeds the scale. In the plant under special consideration the ament is leafy-bracted at base as in *S. petiolaris* and it is nearly as loosely flowered as in that species, the scales are blackish and oblong as in *S. sericea*, and the lance-conic blunt capsule (5–7 mm. long) is elevated on a pedicel which is once and a half or twice as long as the scale.

From *Salix cordata*, which it somewhat resembles in foliage, the problematic willow is quickly distinguished by the pubescent capsule, the smaller usually deciduous stipules, and the strongly whitened lower surface of the leaves, as well as by numerous other characters. A hybrid of this willow and *S. cordata* has been found and is now growing near the ice-house on Cow Island, West Roxbury.

A search in the Gray Herbarium and the Herbarium of the New England Botanical Club has revealed some doubtful foliage-specimens; but only one sheet of specimens which is positively identified with the writer's material has been found. This, however, is a very important specimen, for it is the type of Andersson's *Salix petiolaris*,

a, subsericea,[1] which was collected in May, 1847, at Fresh Pond by the late George B. Emerson. Andersson treated *S. petiolaris* as an aggregate species with five chief components, among them *S. petiolaris, ε, sericea* (*S. sericea* Marsh.). The young branch of the Fresh Pond shrub was described as follows:

"*a, subsericea*, foliis initio sat dense sericeo-pubescentibus demum subglabratis pilis raris subtus derelictis anguste lanceolatis margine crenulatis, amentis subdensifloris, capsulis brevius pedicellatis obtusiusculis. (S. sericea Hb. Asa Gray e Massachusetts). Haec quum habitu tum notis *S. sericeae* maxime affinis, a qua vix differt nisi amentis magis laxifloris, capsulis longioribus et foliis demum subtus subglabratis."[2]

Further search of literature shows that in 1901, Dr. Rydberg, without any apparent knowledge either of Andersson's description or the very accessible type from Massachusetts, made the combination "*Salix sericea subsericea* (Anders.) Rydb.,"[3] citing definitely as a synonym "*S. petiolaris subsericea* Anders.," for a plant with "capsule smaller"! and said to grow from New York to Michigan; although a mere reference to Andersson's original description would have shown that *S. petiolaris, a, subsericea* was clearly stated by Andersson to have the capsules longer ("capsulis longioribus") than in *S. sericea* and to come from Massachusetts.

The latest mention of the plant found is by Schneider in 1904, when he treated it as a hybrid of *Salix sericea* and *S. petiolaris*:

"*S. sericea* × *petiolaris*: *S. subsericea* (*petiolaris var. subsericea* Anderss., in DC., l. c. 234; *sericea var. subsericea* Rydbg., in Britt. Manual 318. *1901*). Scheint unter den beiden Elternnamen in Kultur und hält nach meinen Beobachtungen zieml. genau die Mitte zwischen diesen."[4]

The writer ventures to say that if Andersson had had the material now available he would have considered this willow a good species. It certainly resembles *S. petiolaris* more than it does *S. sericea*; but, as its characters are essentially constant wherever the shrub has been found and as it is quite fertile and without the tendencies we have learned to expect in hybrid willows, there seems to be no reason why

[1] Anders. in DC. Prodr. xvi. pt. 2, 234 (1864).
[2] Anders. l. c.
[3] Rydberg in Britton, Man. 318 (1901).
[4] Schneider, Handbuch der Laubholzkunde, pt. 1, 65 (1904).

it should not have specific recognition. The foregoing observations may be briefly summarized as follows.

Salix subsericea (Anders.) Schneider. Large shrub (2 to 2.5 m. high), with more or less zigzag habit, the reddish- or olive-brown branches making a considerable angle with the trunks; branchlets puberulent when young, soon glabrate: leaves lanceolate, when young loosely sericeous, in maturity glaucous and sparingly sericeous or glabrate beneath, dark green and somewhat lustrous except for the finely puberulent dull pale midrib above, 6–10 cm. long, 1.2–2.2 cm. broad, rather coarsely appressed serrate, the teeth about 5 to a centimeter; petioles slender, 1–1.5 cm. long: stipules small, lanceolate, acuminate, serrulate. Winter-buds puberulent: aments leafy-bracted at base, loosely to subdensely flowered, in maturity 2–3 cm. long: scales oblong, with rounded blackish pilose tips: capsule lance-conic, blunt, loosely sericeous, 5–7 mm. long, its slender pedicel once and a half or twice as long as the scale and many times exceeding the minute gland (about 0.3 mm. long).— Handbuch der Laubholzk. pt. 1, 65 (1904). *S. petiolaris, α, subsericea* Anders. in DC. Prodr. xvi. pt. 2, 234 (1864). *S. sericea subsericea* Rydb. in Britton, Man. 318 (1901) as to name-bringing synonym but not as to plant described. *S. sericea* × *petiolaris* Schneider, l. c. (1904).— Originally described from Fresh Pond, Cambridge, Massachusetts, coll. May, 1847 (*Geo. B. Emerson*): now known to be generally distributed in the neighborhood of Boston; and apparently westward to southern New York.

The writer is indebted to Prof. M. L. Fernald for his kind assistance in the bibliographical part of this article.

Brookline, Massachusetts.

SOME INTERESTING MAINE PLANTS.

Joseph A. Cushman.

During August and September of 1907 I spent the larger part of the time in collecting in various parts of Maine. During August about two weeks were spent about Machias Bay with headquarters at Roque Bluffs. Mr. C. H. Knowlton has already noted the character of the region and some of the interesting plants of the mainland (Rhodora, ix. 218).

With the aid of a boat, Mr. S. N. F. Sanford and I were enabled to visit nearly thirty of the islands in the bay and outside. These islands are almost entirely rocky, with bold cliffs and almost constantly bathed with fog. On them a number of noteworthy plants were found. Among these *Sedum roseum* (L.) Scop. was of interest as it had been found by the Josselyn Botanical Society in one locality, The Point of Main, on the mainland. On the outermost islands it seems to be very common. We collected it on Old Man Island and Double Shot Island off Cutler; Libby Islands off Machiasport; The Brothers Island; and Knight's, Head Harbor, and Mistake Island off Jonesport. At all of these stations the plant was plentiful in the crevices of the cliffs. *Euphrasia Randii* Robinson and *E. americana* Wettst. were common everywhere. On the outer end of Great Wass Island several trees of *Pinus Banksiana* Lambert were seen and in the bog *Eriophorum opacum* (Björnstr.) Fernald was collected, and in the woods *Lycopodium annotinum* L., var. *pungens* Desv. On the flats in Chandler River, *Polygonum Fowleri* Robinson was not uncommon. On the cliffs, especially the outer ones was plenty of *Sagina nodosa* (L.) Fenzl., as well as var. *glandulosa* (Bess.) Asch. On Cross Island, off Cutler, along the border of a salt pond were great mats of *Stellaria humifusa* Rottb. In a small pond just back of the beach on Head Harbor Island was a quantity of *Sparganium simplex* Huds. *Rumex pallidus* Bigel. was common on the beach. Altogether the region is a very interesting one and many other notable plants were collected.

Late August was taken up by a trip to Spencer Lake and Spencer Mountain to the East of Moosehead Lake. These were both interesting, the mountain especially so. Both of the Spencer Mountains rise directly out of low ground and seem to be true monadnocks. They are rather abrupt, wooded to the summit, but with many bare cliffs and slides. About the lake many interesting plants were found. *Carex retrorsa* Schwein., var. *Robinsonii* Fernald on the shore, and beside our camp a fine tree of the true *Betula alba* L. may be noted. Along trails in the woods the delicate *Botrychium ternatum* (Thunb.) Sw., var. *rutaefolium* (A. Br.) D. C. Eaton was not uncommon. In the woods of the north slope at about 2800–3000 ft. were found *Pyrola minor* L., and *Galium kamtschaticum* Steller, two plants of Mt. Katahdin. On the cliffs were many ferns, among them the most interesting being *Aspidium fragrans* (L.) Sw. The height of the mountain as determined by aneroid was 3268 feet.

A few days were spent early in September at Mt. Kineo. On the dry summit was *Juncus tenuis* Willd., var. *Williamsii* Fernald. On the cliffs, *Aspidium fragrans* (L.) Sw., *Draba arabisans* Michx., and *Mentha arvensis* L., var. *glabrata* (Benth.) Fernald. *Arabis Drummondi* Gray was abundant on both Mt. Kineo and Spencer Mt. The later part of September was given to a collecting trip on the Allagash and Upper St. John Rivers. *Potamogeton perfoliatus* L. was common in Churchill Lake, *P. heterophyllus* Schreb., forma *longipedunculatus* (Mérat.) Morong in Eagle Lake, and forma *maximus* Morong in Long Lake. *Viola labradorica* Schrank was collected on an island in Eagle Lake, and on the shore of Umsaskis Lake *Carex Crawfordii* Fernald, var. *vigens* Fernald.

On the St. John the commoner plants were collected: *Halenia deflexa* (Smith) Griseb., *Hedysarum boreale* Nutt., *Salix pellita* Anders., *Viola novae-angliae* House, &c. On one of the bluffs *Rosa acicularis* Lindl., var. *Bourgeauiana* Crepin was still in blossom.

In one place where a brook came down the bank and spread out, a moist area with some grass had been developed among the rocks. Here were a few specimens of the rather rare *Drosera linearis* Goldie. The part of this brook back on the flat country above the river would be well worth investigating, as the bogs there are probably the source of the plants found on the river bank. As these plants were not discovered until late on our last day there, no further tracing of their source was possible.

Boston Society of Natural History.

A NEW HYBRID VIOLET.

F. F. Forbes.

While studying *Viola Brittoniana* Pollard on Charles River Meadows, Dedham, Massachusetts in the fall of 1906, the writer observed a violet of rather unusual appearance. In the color and outline of the leaves it was much like *V. lanceolata* L., which grew plentifully at this station, but the habit was that of *V. Brittoniana.*

The plant was transferred with care to the writer's violet bed in Brookline for further study. It survived the next winter and blos-

somed freely in the spring. The blossoms were somewhat larger than those of *Viola Brittoniana* but of the same blue color and general appearance.

During the summer and fall numerous cleistogamous flowers appeared but all were completely sterile, although no trouble had been experienced in raising an abundance of seed from true *Viola Brittoniana* in this same bed. Several small plants were made from the original one by division in the spring of 1908. All of these plants lived and blossomed profusely; and in July began to throw out leafy stolons, which reached a length of more than three inches, bearing apetalous flowers like those of *V. lanceolata*. These stolons proved conclusively that the plant must be a hybrid between *Viola Brittoniana* and *V. lanceolata*. As far as known, this is the first time a hybrid between these two species or between a blue stemless violet and a white stoloniferous one has been noticed. The hybrid may be described as follows.

Viola Brittoniana × **lanceolata**, n. hybr. Leaves with the color of those of *V. lanceolata*, much more lanceolate in outline, less deeply parted, and more rounded at base than those of *V. Brittoniana*; the leaves of the stolons entire, similar to but somewhat broader than those of *V. lanceolata*; petaliferous flowers differing from those of *V. Brittoniana* chiefly in their larger size: apetalous flowers numerous, on peduncles about the length of the petioles, withering early, always infertile: stolons three or more inches long, vigorous, bearing leaves and apetalous flowers: pubescence and time of flowering like that of *V. Brittoniana*.

Brookline, Massachusetts.

The Bryophytes of Connecticut.[1] — This is a recently issued bulletin of 203 pages. The preface and table of contents are followed by fifteen pages on the general characteristics of the bryophytes, nearly five on the history of bryology in Connecticut, nearly six on distribution according to environment, and two on economic value of bryophytes. The catalogue proper occupies 139 pages. The last 27 pages of the bulletin contain a brief summary of the distribution by orders, a bibliography, and an index to species and synonyms.

[1] The Bryophytes of Connecticut, by Alexander William Evans, Ph.D., and George Elwood Nichols, B. A. State of Connecticut, Public Document No. 47. State Geological and Natural History Survey, Bulletin No. 11. Hartford, 1908.

As might have been expected of these well known bryologists the authors have given us a valuable contribution to the list of local floras. It is considerably more than a catalogue. With its succinct account of the general characteristics of the bryophytes and its more detailed descriptions of the six orders recognized (*Marchantiales*, *Jungermanniales*, *Anthocerotales*, *Sphagnales*, *Andreaeales*, *Bryales*), as well as the numerous and excellent keys to the genera and species, it might almost be classed as a manual were it not for the fact that specific descriptions are omitted. The distribution of each species in the counties and towns of Connecticut is clearly indicated, also the known general range over the surface of the earth.

It is a pleasure to note so few things requiring adverse criticism, and these of little real importance. On page 91 the key indicates *Pogonatum* and *Polytrichum* as having mitrate calyptrae, an error which has appeared in certain other bryological publications during the last generation. After being favorably impressed with the abundance of keys to genera and species one is rather surprised suddenly to realize that there is no key to the orders and families. However, this is of less importance when one remembers that 28 of the 35 families belong to the *Bryales*, and that this order has a general key to all genera, irrespective of their groupings under the families.

Aside from *Hypnaceae* and *Dendroidaceae* the arrangement of families and genera follows the Engler and Prantl system rather closely except that *Weberaceae*, *Buxbaumiaceae*, *Georgiaceae*, and *Polytrichaceae* are placed at the end of the volume, as in Warnstorf's Laubmoose. Several of the Engler and Prantl generic names, e. g. *Apolozia*, *Saccogyna*, *Nowellia*, *Kantia*, *Stephanina*, *Bellincinia*, are respectively replaced in the Connecticut flora by the generally better known names of *Jungermannia*, *Geocalyx*, *Cephalozia*, *Calypogeia*, *Radula*, and *Porella*. In this connection we are glad to note that *Racomitrium* and *Elodium* have their original spelling, and that *Octodiceras*, *Ricciella*, and *Sphenolobus* are raised to generic rank.

This valuable bulletin should be in the hands of all bryologists as well as others who are interested in a model flora of this type, and there is little excuse for its not being there when the State Librarian at Hartford advertises it for the absurdly small sum of thirty cents. — J. Franklin Collins, Brown University.

Vol. 10, no. 120, including pages 209 to 234 and title page of vol. 10, was issued 4 January, 1909.

Gray's New Manual of Botany — 7th Edition

An illustrated flora of the Northern United States and Canada east of the 96th meridian. By Asa Gray, LL.D., late Professor of Natural History, Harvard University. Thoroughly revised and largely rewritten by Benjamin Lincoln Robinson, Ph.D., Asa Gray Professor of Systematic Botany, and Merritt Lyndon Fernald, S.B., Assistant Professor of Botany, Harvard University, assisted by specialists in certain groups. With more than nine hundred text figures.

Regular Edition. Cloth, illustrated, 8vo, 928 pages. Price, $2.50.

Tourist's Edition. Limp leather, 5×7½ inches. Price, $3.00.

AMERICAN botanists, who have been impatiently awaiting the revision of this indispensable work, will be delighted to know that a seventh, completely revised, and copiously illustrated edition, is now ready. The revision has entailed years of work by skilled specialists. No effort or expense has been spared to attain the highest degree of clearness, terseness, and accuracy. The plant families have been rearranged in a manner to show the latest view of their affinities, and hundreds of species have been added to the flora. The nomenclature has been brought into thorough accord with the important international rules recently established — a feature of great significance. Indeed, the Manual is the only work of its scope which in the matter of nomenclature is free from provincialism and rests upon a cosmopolitan basis of international agreement. Nearly a thousand figures have been added, and scores of brief and lucid keys have been introduced in a manner which greatly simplifies the problem of plant identification. The work has been extended to include Ontario, Quebec, and the maritime provinces of Canada.

AMERICAN BOOK COMPANY

New York Cincinnati Chicago Boston

HOME GROWN LILIES.

Fresh from Beds. Wild Flowers, Hardy plants of all kinds.
Send for catalogue.

F. H. Horsford, Charlotte, Vt.

BIRDS OF MAINE

is the latest and most complete work on northeastern bird life. It is an illustrated work of 693 pages and contains descriptions of the plumage and full accounts of the nests, eggs, habits and general home life of 327 species of birds. As a book for the amateur or for the scientific student of bird life in northeastern America it is unexcelled. Sent prepaid on receipt of price, $3.50. Address all orders to

ORA WILLIS KNIGHT, 84 Forest Avenue, Bangor, Maine.

CAMBRIDGE BOTANICAL SUPPLY COMPANY,

WAVERLEY, MASS.

BOTANICAL SUPPLIES OF EVERY DESCRIPTION.

Samples of Driers and Mounting Papers sent on request.
ASK FOR NEW CATALOG, NO. 91.

STANDARD MATERIAL. IMMEDIATE SHIPMENT.

Physiological Instruments. How do Plants Work?

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB.

Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS
MERRITT LYNDON FERNALD } Associate Editors.
HOLLIS WEBSTER

WILLIAM PENN RICH
EDWARD LOTHROP RAND } Publication Committee.

Vol. 11. February, 1909. No. 122.

CONTENTS:

New Species of Cladophora. *F. S. Collins* 17
Notes for Shelburne, New Hampshire. *Walter Deane* . . 21
Notes on Monostroma. *F. S. Collins* 23
Winter meeting of the Vermont Botanical Club. *N. F. Flynn* 27
Tubers on Roots of Eleocharis. *K. M. Wiegand* . . . 29
Certain Weeds of Northern New Hampshire. *A. S. Pease* . 30
Plants of Centerville, Maine. *L. O. Eaton* 30
A pubescent Variety of Aster dumosus. *M. L. Fernald* . . 31
A Juncus new to New England. *A. S. Pease* 31
Weight of Ice-covered Twigs. *J. F. Collins* 32

Boston, Mass.
1052 Exchange Building.

Providence, R. I.
Preston and Rounds Co.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price $1.00 per year ($1.25 to all foreign countries including Canada); single copies 15 cents. Volume 1, $2.00, Vol. 2, $1.50. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

B. L. ROBINSON, Clement Circle, Cambridge, Mass.

Subscriptions, advertisements, and business communications to

W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

Single copies may be had from

E. L. RAND, Corresponding Sec'y N. E. Botanical Club,

1052 Exchange Building, Boston, Mass.

Entered at Boston, Mass., Post office as Second Class Mail Matter

SYNOPTICAL FLORA OF NORTH AMERICA, by A. GRAY and others. Vol. I. Fascicles 1 and 2. A critical treatment of forty-five families of polypetalæ (*Ranunculaceæ to Polygalaceæ*) 1895-1897. $5.20.—GRAY HERBARIUM of Harvard University, Cambridge, Mass.

NEW ENGLAND WILD FLOWERS AND THEIR SEASONS, by WILLIAM WHITMAN BAILEY. Price 75 cents net.—PRESTON & ROUNDS Co., Providence, R. I.

NOTICE

On and after April 1, 1907, the price of Volume 1, (1899) of RHODORA will be $2.00, and Volume 2, $1.50.

Complete sets of these two volumes are in very limited supply and will soon be exhausted. Volumes 3 to 8 can still be supplied at $1.00 each, unbound.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collectors' memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3–4 in. *1 year $4.00, 6 months $2.50.*

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 11. February, 1909. No. 122.

NEW SPECIES OF CLADOPHORA.

F. S. Collins.

(Plate 78.)

Cladophora microcladioides n. sp. Frondibus plus minusve caespitosis, 10–20 cm. altis; filamentis basi circa 200 μ diam., rigidis, rectis vel flexuosis, distanter di- trichotomis, ramis similibus, erectis aut plerumque recurvatis, ramulos breviores secundatos latere superiore et interiore gerentibus; ramificatione ejusmodi iterata in ramellos ultimos paucicellulares subacutos, 80–100 μ diam., desinente; cellulis diametro 2–6-plo longioribus; membrana cellulari crassa, in cellulis adultioribus lamellosa. Ramis fere e cellulis omnibus ortis, singulis, vel ad quatuor e cellula singula.

Fronds more or less tufted, 10–20 cm. high; filaments about 200 μ diam. at the base, stiff, erect or flexuous, distantly di- trichotomous; branches similar, erect or more generally recurved, bearing shorter ramuli, secund on the upper or interior side; repeated ramification of this kind ending in few-celled subacute ultimate ramelli, 80–100 μ diam.; cells 2–6 diam. long; cell wall thick, in older cells lamellose. Branches arising from almost every cell, singly, or up to four from one cell.— Coast of California, from Monterey to San Pedro.

A stout but graceful species, with a characteristic ramification, like that of the red alga, *Microcladia borealis* Ruprecht. There is considerable variation according as the main divisions are straight or flexuous, the branches close or more distant, erect or recurved; but the peculiar symmetrical ramification will distinguish it from any other of the American species. In the most typical form, every branch is regularly recurved, and bears on its convex side a series of similar but smaller branches, which curve uniformly in the opposite direction; and in turn bear another similar series. In some plants the branching is very dense, two, three or even four branches issuing from the top

of a single cell, which may be twice as broad at the top as below; usually all but one of these branches are short and simple or nearly so; one being longer, and developing in the typical way. However many branches may issue from one cell, they are never whorled, but expand flabellately in one plane. In the writer's herbarium are specimens from Monterey, collected by Prof. G. J. Pierce, and from San Pedro, collected by Miss S. P. Monks and by Dr. N. L. Gardner; the specimens from the last are in the best condition, and should be considered the type.

C. Howei n. sp. Filamentis repentibus vel decumbentibus, caespites densos formantibus; cellulis irregularibus, circa 150 μ diam., in cellula terminali ad 75 μ attenuatis; longitudine diametron aequante vel triplo superante; filamentis erectis, basi circa 50 μ diam., ad 20–25 μ diam. in apice rotundato vel subacuto attenuatis, e filamentis basilaribus exeuntibus, cellulis basi diametro 5–6-plo prope apicem ad 15–20-plo longioribus; filamentis erectis parce ramosis, ramis erectis vel adpressis, filamentis erectis similibus.

Filaments creeping or decumbent, forming dense tufts; cells irregular, about 150 μ diam., diminishing to 75 μ in the terminal cell, one to three diam. long; vertical filaments, about 50 μ diam. at the base, diminishing to 20–25 μ at the rounded or slightly acute apex, issuing from the basal filaments; cells 5–6 diam. long at the base, 15–20 at the tip; vertical filaments sparingly branched, branches erect or appressed, similar to the vertical filaments.—Gibbet Island, Bermuda, June, 1900, collected by Dr. M. A. Howe, No. 33. Type material in the herbarium of the writer and that of the New York Botanical Garden.

Forming a dense coating in tide pools, about 1 cm. high; the base a dense mass of dark green, much branched, irregular filaments, from which arise the slender, slightly branched, long-jointed filaments, pale green under the microscope, yellow in the mass. This yellow may not be a permanent character, as the same shade appears to be produced by local conditions in some algae normally green. The contorted, densely matted basal filaments suggest the subgenus *Aegagropila*, but there is no indication of a definite form to the whole mass. The sharp distinction between the delicate, erect filaments and the stout, thick-walled basal growth, reminds one of certain fresh water species of *Cladophora*, in which cells, often remaining connected in filaments, pass the winter in a thick-walled, akinete state, emitting new and quite different appearing filaments in the spring. But in *C. Howei* the stouter cells do not seem like akinetes, and appear to continue to

grow and divide, the terminal cells being considerably more slender than the others, but much larger than those of the erect filaments.

C. graminea n. sp. Frondibus caespites laxos formantibus, 10–15 cm. longis, cartilagineis, prasinis; filamentis primariis 300 μ diam., distanter di- trichotomis; ramis omnibus erectis, ramulis ultimis 100–150 μ diam., apicibus obtusis vel subacutis; cellulis inferioribus praelongis, ad 30-plo longioribus quam crassis; superioribus brevioribus, eis ramorum ultimorum diametro 4–6-plo solum longioribus; cellula singula normaliter spatium inter dichotomias proximas occupanti; membrana cellulari plerumque valde striata.

Fronds forming loose tufts, 10–15 cm. long, cartilaginous, dark green; main filaments 300 μ diam., distantly di- trichotomous; all divisions erect, ultimate divisions 100–150 μ diam., tips blunt or slightly acute; cells very long, up to 30 diam. below, shorter above, in the ultimate branches 4–6 diam., each cell normally occupying the space between two successive forkings; cell wall usually strongly striate.— Monterey to San Pedro, California.

Distinguished from all our other species by the long cells, each normally extending from one forking to the next; in this it agrees with *C. pellucida* (Huds.) Kütz. of Europe, but in the latter there is more reduction of size in the successive orders of branches, the main filament being sometimes as large as 500 μ diam., while the ultimate ramuli are seldom over 50 μ, and are dense and more or less fasciculate. In *C. graminea* there is comparatively little diminution in size, and the tips are loose and open. In *C. pellucida* the divisions of the di- or trichotomy are usually equal and develop equally; in *C. graminea* one is often much reduced, sometimes being only a single cell. The original specimen was sent the writer by Mrs. A. E. Bush, under the name of *C. cartilaginea* (Rupr.) Harvey, and there is a certain similarity of habit; but Ruprecht's *Conferva cartilaginea* is not a true *Cladophora*, and probably should be placed in *Spongomorpha*. Mrs. Bush's specimen, in herb. F. S. C., is the type of *C. graminea*.

C. constricta n. sp. Fronde dense caespitosa, ad 10 cm. alta, subfastigiata; filamentis primariis ad 65 μ diam., ramis minoribus, ramulis ultimis circa 25 μ diam.; cellulis diametro 5–20-plo longioribus, plerumque leviter clavatis, frequenter constrictionem annularem distinctam paulo super basin exhibentibus. Ramificatione plerumque opposita inferne et saepe superne, saepe etiam laterali, ramulis brevibus subsecundatis; ramis et ramulis primo subpatentibus, mox sursum curvatis; apice cellulae terminalis breviter conicali-rotundata.

Frond densely tufted, up to 10 cm. high, somewhat fastigiate; main filaments to 65 μ diam.: branches smaller, ultimate ramuli about

25 μ; cells 5–20 diam. long, mostly somewhat clavate; often with a distinct annular constriction shortly above the lower end; branching mostly opposite below and often above, but also often lateral, the short ramuli somewhat secund; branches and ramuli at first rather patent, soon curving upward; apex of terminal cell shortly conical with rounded tip.— Montego Bay, Jamaica, June 12, 1907. Collected by Dr. M. A. Howe, in connection with the expedition of the New York Botanical Garden to Jamaica. No. 4978. Type material in herb. F. S. C. and herb. N. Y. B. G.

In general appearance this species reminds one of a small and dense form of *C. gracilis* such as is often found in shallow pools on the north Atlantic coast, but the resemblance is merely external, the branching being more like that of *C. rupestris*, from which, however, it differs much in dimensions and texture. The cells vary in length, but average quite long, and usually increase slightly in diameter from the base to the summit. In the older parts the branching is quite regularly opposite, and as the basal cells of each branch are of the same size as the cell of the main filament arising between them, the effect is that of trichotomy. In a few cases four practically similar cells have been seen arising from the same point. As a branch or a pair of branches arises from about every second cell of a filament, the frond becomes very dense, and as the development seems to go on quite uniformly throughout the frond, the outline is usually regular. The constriction does not occur on all the cells, and may be more or less prominent; often it is very distinct, the diameter of the cell being reduced at this point to less than half the normal, the interior thickening of the cell wall contributing to the reduction. This constriction is interesting as showing a possible relation to the *Valoniaceae*, in which the character is sometimes strongly developed.

Malden, Massachusetts.

Explanation of Plate 78.

Fig. 1, *Cladophora Howei*, portion of basal filament with erect branches.
Fig. 2, " *microcladioides*, portion of densely branching frond.
Fig. 3, " " general scheme of branching.
Fig. 4, " *constricta*, trichotomy in a main branch.
Fig. 5, " " main branch, outline only.
Fig. 6, " *graminea*, end of branch, outline only.

NOTES FROM SHELBURNE, NEW HAMPSHIRE.

Walter Deane.

I have spent portions of many seasons in Shelburne, New Hampshire, a town of some three hundred inhabitants, lying on both sides of the Androscoggin River. The valley is about 210 meters above sea level and the flora is characteristic of northern New Hampshire, but a record of a few plants found there may prove of interest. The two pines of the region are *Pinus Strobus* L. and *Pinus resinosa* Ait., the former of wider distribution. In the summer of 1881 I discovered a fine specimen of *Pinus rigida* Mill. on a wooded slope about 35 or 40 meters above the intervale on the farm of Mr. A. E. Philbrook. Under date of February 8, 1909, Mr. Philbrook writes: "The Pitch Pine you found in 1881 is sixty feet tall and thirteen inches in diameter, is in good condition and has cones. Two small ones have come up near by that are about twenty feet high and three or four inches in diameter." Dr. A. S. Pease and Mr. A. H. Moore, who have been working very systematically for a number of years on the flora of Coos County, which includes the town of Shelburne, have been unable thus far to detect any more Pitch Pine in their limits. It was, therefore, with added interest that I was shown in October, 1908, two additional trees in Shelburne. On October 18, Professor Ephraim Emerton, who has a summer home adjoining the Philbrook Farm, showed me on the plateau near his house a vigorous Pitch Pine about 5 meters high and fully 1.5 decimeters through 12 decimeters above the ground. It was growing naturally in a grove of White and Red Pines and it may have been a seedling from the one previously mentioned from which it is about 4 hectometers distant, or perhaps from the third specimen which is on a wooded slope about midway between the two.

This last tree was shown me on October 25 by Mr. Philbrook on whose farm it grows, but a few minutes' walk from the tree of 1881. This pine is about 18 meters high, 5 decimeters through at the butt, and 4 decimeters through some 12 or 15 decimeters above the ground. It is a fine straight specimen full of cones, but leafy only near the top owing to its close proximity to the surrounding trees. No seedlings were discovered.

Another interesting find for Coos County is *Juniperus communis*

L., var. *depressa* Pursh. On April 23, 1908, Mr. Philbrook discovered a specimen of this shrub in a patch of open woods adjoining his farm about 20 meters above the intervale. The plant was about 3 meters in diameter and was full of fruit. Mr. Philbrook sent me a specimen at the time, and later I visited the place and secured additional material. On October 13, but a few minutes' walk from this Juniper and in the same open wood, a second specimen was discovered by a party of us who were out for a tramp. It was a little smaller than the first one but bore fruit. These two Junipers and three Pitch Pines constitute at present the only known records for Coos County though, considering the known range of the two species and the fact that there are plenty of situations congenial to them, it seems hardly possible that additional ones should not be found.

On May 29, 1903, I discovered *Camelina microcarpa* Andrz. in a grassy field in Shelburne, and on July 14, 1908, I found by the railroad station the same species, together with *Erysimum cheiranthoides* L. and *Sisymbrium altissimum* L., all in close proximity and in flourishing condition. These introductions are now quite widely spread over New England.

Pentsetmon laevigatus Ait. appeared in Shelburne in June, 1908. It was discovered by Miss Louise Davenport in the intervale of the Philbrook Farm, growing among the short grass, some 300 meters from the house. There were at least eight plants covering an extent of about one fifth of a hectare, each specimen about 30 meters from its nearest neighbors. The plants were all in good flower though the soil, owing to the extreme drought, was very dry. I visited the place on July 3 and examined the location. I have in my herbarium specimens of all these herbaceous species.

Cambridge, Massachusetts.

NOTES ON MONOSTROMA.

F. S. Collins.

The genus *Monostroma*, as proposed by Thuret,[1] included only those species of the older genus Ulva that had a single layer of cells, quasi-independently located in a gelatinous membrane. Those forms with a single layer of cells, arranged parenchymatously, the same as the double layer in Ulva, in the restricted sense, were included in Enteromorpha. Under the name of *Enteromorpha Grevillei* Thuret included *Ulva Lactuca* Agardh,[2] and the species of the same name of Greville,[3] neither of these being the *U. Lactuca* Linnaeus.[4] Le Jolis,[5] extends the genus Ulva to include Enteromorpha, and the species in question appears as *U. Grevillei* (Thur.) LeJolis. Wittrock,[6] gave the genus Monostroma the extension that it has since held; to include all the *Ulvaceae* with a single layer of cells, arranged as a membrane, whatever the texture of the latter. The species in question here appears as *Monostroma Grevillei* (Thur.) Wittrock. Both Le Jolis and Wittrock gave the references to Agardh and Greville in the synonymy. J. G. Agardh [7] appears to have been the first to point out that it was by no means certain that the plants mentioned by the elder Agardh and by Greville were identical, and though he gave the distinctions with considerable detail, his views do not appear to have been accepted by later writers. That there are two forms, quite distinct in their typical appearance, though possibly intermediate forms may be found, seems to the present writer to be the fact. Both occur on the New England coast, and both have been distributed in the Phycotheca Boreali-Americana; *M. Grevillei* as No. 15, *M. Lactuca* as No. 1271. Both are at first saccate, but the sac in *M. Grevillei* is nearly globular, in *M. Lactuca* more elongate; in the former species it soon splits into broad segments of irregular shape; in the latter into long, sublinear laciniae, often with a stipe-like base; these laciniae

[1] Note sur la synonymie des Ulva Lactuca et latissima L., etc. Mém. Soc. Sci. Nat. de Cherbourg, Vol. II, p. 29, 1854.

[2] Sp. Alg., Vol. I, p. 409, 1822.

[3] Algae Britannicae, p. 172, 1830.

[4] Sp. Plantarum, Vol. II, p. 1163, 1753.

[5] Liste des algues marines de Cherbourg, p. 37, 1863.

[6] Försök till en monographi ofver algslägtet Monostroma, 1866.

[7] Till Algernes Systematik, VI, Ulvaceae, Lunds Univ. Arsskrift, Vol. XIX, p. 101, 1882.

may be simple or forked, and usually have the edges crisped; when they are simple, there is quite a resemblance to a clump of individuals of *Enteromorpha Linza* (L.) J. Ag.; when forked, the resemblance is equally marked to *Ulva fasciata* Delile; the laciniae are sometimes quite palmately arranged. The frond of *M. Lactuca* is somewhat thicker; 20–25 μ, as against 15–20 μ in *M. Grevillei*; the structure of the former is more distinctly parenchymatous, and the texture less soft and lubricous. In a cross section of a vegetative frond the cells show much alike, horizontally elongate, occupying about two thirds of the thickness of the frond.

In Wittrock's monograph, Plate IV, fig. 14, c, represents a fruiting frond, with the characters of *M. Lactuca*; in *M. Grevillei*, as observed by the writer, the fertile portion of the frond puts on quite a different appearance; the membrane becomes thicker and more gelatinous, the cells elongate vertically to the surface of the frond, finally assuming the palisade form characteristic of *M. fuscum*, though on a smaller scale; as the spores are discharged, the membrane melts away, and there is nothing of the persistent empty tissue, shown in *M. Lactuca*, which was the principal character for the exclusion of the species from Monostroma by Thuret and Le Jolis. The writer does not claim the original discovery of this form of spore production; it has been noted by Rosenvinge [1] but he thinks that this is the first suggestion that it may be a distinguishing character between the two species. Specimens in this fruiting condition have been distributed as P. B.-A., No. 1467.

The question of how far related forms, evidently closely connected, are to be distinguished as species, will probably always be a matter of discussion; so much depends on the way of looking at the matter. Jónsson,[2] refers to the writer's arrangement of *M. Grevillei* and allied forms,[3] as follows:— "I cannot admit Collins to be right in dividing *M. Grevillei* K. Rosenv. into two species: *M. Grevillei* Collins including var. *Vahlii* K. Rosenv., and *M. arcticum* Collins including var. *intestiniformis* K. Rosenv. The limit between the two species as understood by Collins, is as indistinct as the limit between the main form of the species and the included varieties. If closely related forms, which run into each other, are not to be regarded as belonging to one

[1] Grønlands Havalger, Meddelelser om Grønland, Vol. III, p. 948.

[2] The marine algae of East Greenland, Meddelelser om Grønland, Vol. XXX, p. 65.

[3] The Ulvaceae of North America, Rhodora, Vol. V, p. 13.

and the same species, we had better take as a species every form that can be described plainly enough to be recognizable, than form species of artificially grouped forms." While this last suggestion goes too far, something near it may be temporarily admissible until we have a life history of each species, from the spore on. In the meantime it is almost as hard to draw sharp lines between *M. undulatum* Wittr., *M. pulchrum* Farlow and *M. Grevillei*, as they occur on the American coast, as it is between *M. Grevillei* and *M. arcticum*, as we understand them; for the sake of clearness it has seemed better to the writer to make more specific distinctions than Rosenvinge found expedient; in the matter of *M. Grevillei* and *M. Lactuca*, it is hoped that the new character, in the fertile frond, will render this distinction more acceptable. As this very distinct form of the fertile cell really amounts to the formation of a specialized sporangium, it would seem to place this species at the head of the genus.

At page 63 of Jónsson's work, he refers again to the writer's paper on the *Ulvaceae*, calling attention to Rosenvinge's note[1] that the cells of *M. fuscum* (Post. & Rupr.) Wittr. contain two chromatophores, one at each end; adding as a footnote, "F. S. Collins (The Ulvaceae etc.) does not at all mention this important character neither in the description of the species nor in the description of the genus Monostroma." The writer has since made a careful examination of fresh material, collected at Revere Beach, Massachusetts, the locality at which were collected the specimens distributed as Phyk. Univ., No. 64, and P. B.–A., No. 715. In every instance a single chromatophore was found in a cell. It is, of course, possible that the Greenland plant is different from the plant of the New England coast, but this is hardly likely, as the figure in Wittrock, l. c., Pl. III, fig. 11, shows a perfectly uniform chromatophore, quite like the Revere Beach plant; and this was drawn from a specimen collected in Norway. A more probable explanation is suggested by the fact that in dried specimens of green algae the contents of the cells shrink, and the remains of the chromatophores tend towards the ends, leaving the middle apparently empty; this is very conspicuous in plants with large cells, like *Chaetomorpha Melagonium* (Web. & Mohr) Kützing.

M. orbiculatum Thuret,[2] was not mentioned in the writer's paper on *Ulvaceae*, previously referred to, but what appears to be this species

[1] Grønlands Havalger, Meddelelser om Grønland, Vol. III, p. 940.

[2] Mém. Soc. Sci. Nat. de Cherbourg, Vol. II, p. 388, 1854.

occurs at Bermuda,[1] and on the Pacific coast near San Francisco, W. A. Setchell. It has fronds of a general orbicular outline, but more or less cleft and usually considerably plicate; the frond 30–40 μ thick, parenchymatous in structure, the cells angular, of irregular form, the chromatophore similar in shape but considerably smaller; cells in cross section rounded, generally vertically elongate, 25–30 μ high, the chromatophore occupying the middle part of the cell. The frond is at first attached by fibrillar prolongations from the lower cells, but soon becomes free, and floats in quiet salt and brackish waters, the same as *M. latissimum*. The texture appears to be firmer and the substance less gelatinous than in *M. latissimum*, and the dried specimen does not adhere very well to paper.

In July, 1907, the writer found at Eastham, Massachusetts, along the shore of the "Salt Pond," the expanded upper end of a long creek among the salt marshes, a plant which at first he supposed to be a new species, but which on the whole may better be included under *M. orbiculatum*. It formed rounded rosette-like masses on the mud just above low water mark; attached by the center, a single individual being as much as 25 or 30 cm. in diameter of expansion. The folds in the frond were so abundantly developed that the appearance was that of a clump of many individuals, but in each case it proved to be one plant. In appearance, the cells were like those of typical *M. orbiculatum*, but in cross section the thickness of the frond ranged from 60 μ in the lower part, to 16 μ near the margin, and the cells throughout showed either a circular or a horizontally elongate section. Quite an area of the under side in the center of the frond was furnished with the fibrillar growths from the cells, which were here larger and of more irregular shape than in the rest of the frond. It may be characterized as follows: —

M. ORBICULATUM forma **varians** n. f. Fronde eximie plicata, substrato diu affixa; in sectione transversali 50–60 μ crassa basin versus, prope marginem tenui, 16–20 μ; cellulis in sectione plus minusve horizontaliter elongatis.

Frond extremely plicate, remaining long attached to the substratum; in cross section 50–60 μ thick near the base, thin near the margin, 16–20 μ; cells more or less horizontally elongate in cross section. — Eastham, Massachusetts, near low water on muddy shore of marsh creek.

MALDEN, MASSACHUSETTS.

[1] Farlow in Farl. And. & Eaton, Alg. Am.-Bor. Exsicc., No. 173.

THE WINTER MEETING OF THE VERMONT BOTANICAL CLUB.

Nellie F. Flynn.

The fourteenth annual meeting of the Vermont Botanical Club was held at Middlebury, January 21–23, 1909, in conjunction with the Vermont Bird Club and the New England Federation of Natural History Societies. The joint programme was diverse and full of highly interesting features. Only the botanical papers can be mentioned here and these briefly.

Dr. Brainerd of Middlebury spoke of fifteen hybrids possible in a group of six related Aspidiums. Most of these hybrids have already been found, many of them in Vermont.

Mr. W. H. Blanchard of Westminster discussed many new species and forms of Rubus. The fact was pointed out that no less than sixteen of these are included in the new edition of Gray's Manual.

Prof. L. R. Jones of the University of Vermont spoke of the grasses, especially of the genera Agropyron, Agrostis, and Panicum, and showed the changes of classification and nomenclature of these groups as treated in the new Gray's Manual and in the revised Flora of Vermont now in preparation.

Mr. W. W. Eggleston of Washington, D. C., discussed from the same point of view some difficult genera of the Rose Family, especially Amelanchier, the Shad Bushes.

Misses A. L. Carpenter and Mary Robinson, of the University of Vermont, presented a revised list of Vermont ferns, classified according to the new Manual, with the result that no less than six species, varieties, and forms are added to the old list.

Mr. Rufus Crane of Middlebury College read an interesting paper on "Hybrid Baneberries" and exhibited specimens of the red and white baneberries and of some anomalous intermediate forms. These were mentioned by Dr. Gray forty years ago, but only one is described in the new edition of Gray's Manual. Mr. Crane and Dr. Brainerd have recently found evidence that these forms are probable hybrids, which follow Mendel's law. In the hybrids the red color dominates over the white, and the seeds are reduced in number, indicating a loss of fertility.

Mr. J. E. Crane of Middlebury spoke interestingly of the different plants from which bees gather honey. The number was larger than is generally supposed. Samples of the honey made from the flowers of basswood, raspberry, alfalfa, and buckwheat were shown, and it was stated the raspberry honey took the highest prize at the Jamestown Exposition.

Miss Carrie W. Ormsbee of Brandon read a carefully prepared paper on "Forestry and Water Supply."

Mrs. D. C. Webster of Hartland gave a report of the orchids thus far found in that town. They number thirty-five.

Miss Nancy Darling described and exhibited in mounted specimens a number of the rarer plants of the Eshqua Bogs in Hartland.

Prof. A. J. Grout presented a paper on "Nature study in the Public Schools."

Mrs. E. B. Davenport of Brattleboro read a paper showing that the copious gathering of ferns for florists was becoming a serious menace to our native fern flora.

Mr. George L. Kirk of Rutland told of a new station, near that city, for the Chain Fern, *Woodwardia virginica* (L.) Sm. No less than two or three hundred plants were found. They were in groups upon a typical sphagnum bog. With them grew large quantities of *Osmunda cinnamomea* L., of which much was of the var. *incisa* J. W. Huntington. It was stated that specimens of this variety had been sent to the Gray Herbarium and were reported the first ever received from Vermont.

Mrs. Carrie E. Straw of Stowe reported an addition to the flora of Vermont in *Eruca sativa* L.

Miss Alice E. Bacon of Bradford gave some additional evidence as to the poisonous qualities of the Showy Lady's Slipper.

Mr. N. J. Giddings of the University of Vermont described the lifting power of a fungus growing under a tar-concrete walk, its lifting strength being estimated at two tons.

Many shorter papers on many topics were presented, and an account of the summer meeting on Mt. Mansfield was given by Mrs. Nellie F. Flynn of Burlington.

Officers of the Club were elected as follows: Pres., Ezra Brainerd, Middlebury. Vice-pres., C. G. Pringle, Burlington. Sec., Prof. L. R. Jones, Burlington. Treas., Mrs. Nellie F. Flynn, Burlington. Librarian, Miss Phoebe M. Towle, Burlington. Executive Committee,

D. S. Carpenter of Middletown Springs, Mrs. E. B. Davenport, Brattleboro, and Miss Nancy Darling, Woodstock. Committee to determine the time and place of the summer meeting, Dr. H. H. Swift, Pittsford, Mr. W. W. Eggleston, Washington, D. C., and Prof. L. R. Jones, Burlington.

It is probable that the summer meeting will be held at some point on Lake Champlain, during the week of the ter-centennial celebration of the discovery of the Lake, probably July 6 and 7.

Burlington, Vermont.

Tubers on the Roots of Eleocharis interstincta and E. quadrangulata.— One afternoon last October the writer, in company with Prof. M. L. Fernald, dug some specimens of *Eleocharis interstincta* and *E. quadrangulata* in Waban Lake, Wellesley, Massachusetts. On the roots of *E. quadrangulata* elliptical or oblong, pale, tuber-like growths were found varying in length from 2–8 mm. They were situated on the finer branches of the root at some distance back of the tip, but the portion of the root beyond the tuber had disappeared in all but the younger examples. The frequency of the occurrence was variable, some plants apparently bearing none, others several. Sections through all parts of the tuber showed the presence of the regular root-structure,— a central vascular cylinder, and a cortex which in this case was very much thickened and gorged with starch. On the same plant with fresh tubers, older tubers were found on older roots. These consisted of a shell-like outer covering, and the woody central cylinder, but were otherwise hollow, thus suggesting that the starchy material had been removed for use. The tubers of *E. interstincta* were similar in every respect.

It was first thought that the tubers were of the nature of galls, but no evidence was found to support this view. It would be interesting to know if similar tubers are found on these two species in other localities farther southward, and if there is any evidence that they are not true tuberous roots. The writer has been unable to find reference to the occurrence of such growths on the roots of any species of *Eleocharis* though similar ones are known to occur in *Cyperus*.— K. M. Wiegand, Wellesley College.

Certain Railroad Weeds of Northern New Hampshire.— On 24 August, 1908, while making a trip over the Baldcap Range from Shelburne into the township of Success, New Hampshire, Mr. A. H. Moore and the writer discovered, in the latter township, on the gravelly bed of an abandoned lumber-railroad, a flourishing colony of *Gnaphalium sylvaticum* L. The railroad has not been used for years, and this locality, itself on a branch line, is some miles from any settlement, the nearest at present being Berlin, five or six miles distant.

Various plants of interest have appeared along the Grand Trunk Railroad in northern New Hampshire. Most prominent is *Euphorbia hirsuta* Wiegand, which has formed large mats along the track in Berlin and Gorham, and in September is very conspicuous from the orange color of its stems and foliage. *Ambrosia psilostachya* DC. grows along the Grand Trunk near Berlin, and there are two clumps of *Artemisia ludoviciana* Nutt. along the Boston and Maine tracks in the same town. *Euphorbia Helioscopia* L., *Chenopodium glaucum* L., and *Salsola Kali* L., var. *tenuifolia* G. F. W. Mey. are also of local occurrence in Berlin. *Polygonella articulata* (L.) Meisn. may be traced along the Maine Central up through Crawford Notch to Crawford's, where it appears sporadically, and still farther north, on the Boston and Maine, near Appalachia Station in Randolph, it is thoroughly and abundantly established. Specimens of these plants are preserved in the writer's herbarium.— Arthur Stanley Pease, Cambridge, Massachusetts.

Additional Notes on Plants of Chesterville, Maine.— The most noteworthy plants found in this vicinity during the summer of 1908 were discovered in the month of June by Miss F. J. Keyes and were as follows.

Habenaria bracteata (Willd.) R. Br., in a swamp on Zion's Hill, near North Chesterville.

Arethusa bulbosa L., in a bog bordering on Lock's Pond, near North Chesterville. According to the present knowledge of the writer, this is the second station, both in Chesterville and Franklin Co., for this interesting little citizen, *Arethusa,* while it also extends its range a few miles farther north.

The first mentioned find, *Habenaria bracteata* R. Br. with *Habenaria*

Andrewsii White, for which the new Manual gives South Chesterville as one of its two stations, the other being Pownal, Vt., swells the list of Chesterville orchids to twenty-nine — not a bad showing for one small town.— LILLIAN O. EATON, Mt. Vernon, Maine.

A PUBESCENT VARIETY OF ASTER DUMOSUS.— In a large collection of Michigan plants collected the past year by Mr. C. K. Dodge there is an Aster of unusual interest. The plant, which is stated by Mr. Dodge to be "very common on Hersen Island and all islands formed by the mouths of the St. Clair River, in damp and marshy ground," is superficially like *Aster dumosus* L., var. *strictior* T. & G. In fact it would at first sight pass as a good match for one of the original sheets of var. *strictior* collected by Pitcher at Fort Gratiot, Michigan, and later material from Sandwich, Ontario. The var. *strictior*, however, like the other described variations of *A. dumosus*, is an essentially glabrous plant, while the characteristic plant from the islands at the mouth of the St. Clair River has its stem and to some extent its leaves cinereous with very dense short harsh pubescence. In this character the plant is comparable with *A. paniculatus* Lam., var. *cinerascens* Fernald. The plant from Michigan may be designated.

ASTER DUMOSUS L., var. **Dodgei**, n. var., omnino ut var. *strictior* sed caule dense scabro-puberulo, pilis cinereis; foliis scabris puberulis. — MICHIGAN, in damp and marshy ground on Hersen Island and other islands at the mouth of the St. Clair River, St. Clair County, September 17, 1908 (*C. K. Dodge,* nos. 84, 85).— M. L. FERNALD, Gray Herbarium.

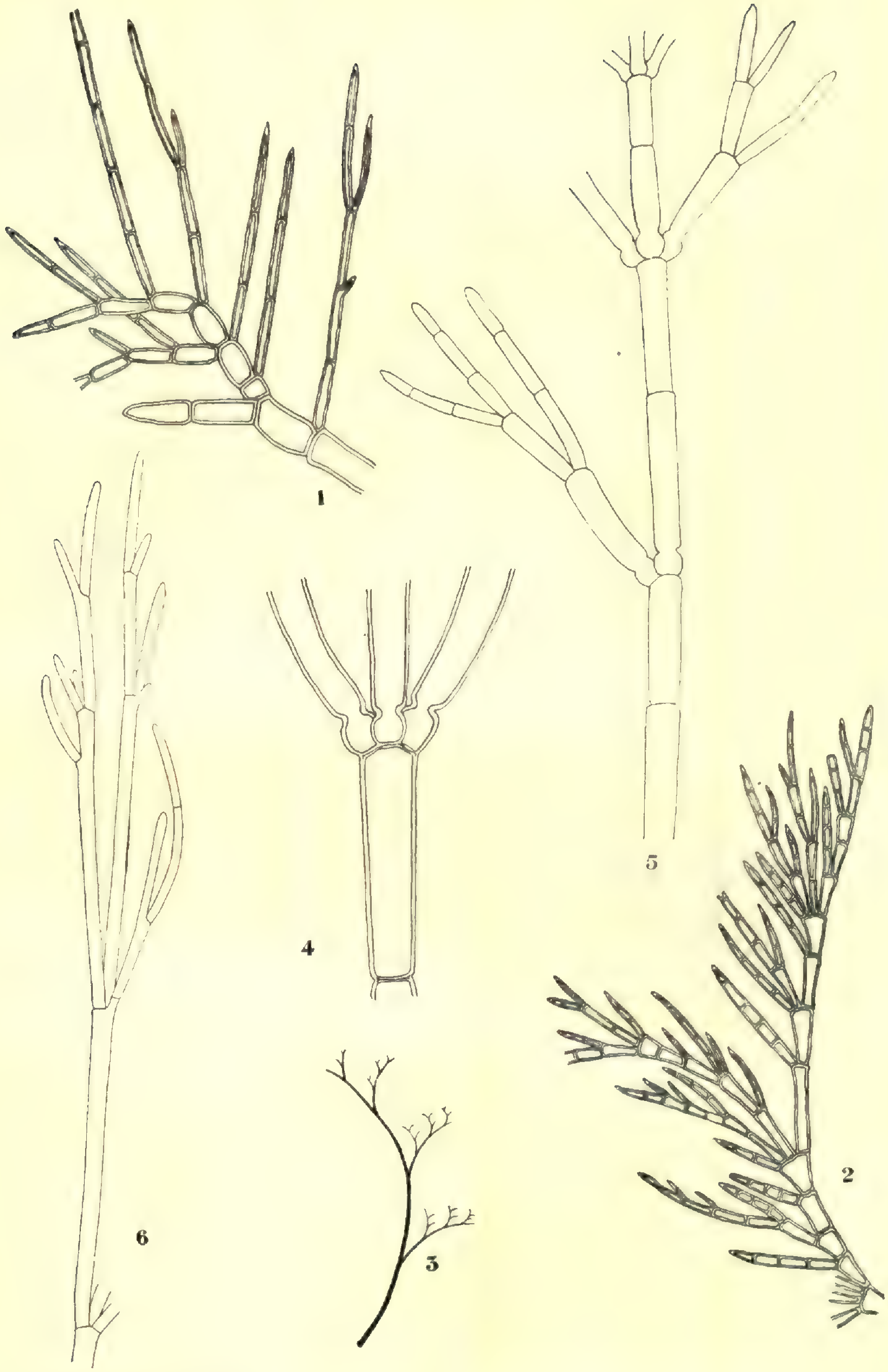
A JUNCUS NEW TO NEW ENGLAND.— On 16 August, 1907, while climbing Table Rock at Dixville Notch, New Hampshire, I collected on the talus slopes a specimen of what I at the time supposed to be *Juncus trifidus* L. Upon comparison, however, with specimens at the Gray Herbarium, it appeared to be *Juncus trifidus* L., var. *monanthos* (Jacq.) Bluff & Fingerhuth, a variety not reported in the seventh edition of Gray's Manual as occurring north of southern New York. Its presence at Dixville indicates that it should be searched for at other points in New England.— ARTHUR STANLEY PEASE, Cambridge, Massachusetts.

The Weight of Ice-covered Twigs.— On the morning of the 18th of January, 1909, the trees about Providence were covered with a thick coating of clear ice which resulted in the breaking of quite a number of branches, though not to the extent that one might have expected. The writer became interested in ascertaining the additional weight placed upon the smaller twigs by this icy coating. The figures obtained may be of interest to others who have never made accurate weighings under similar conditions. Several ice-incrusted twigs from each of three different plants were selected. Those from the Lilac and Apple were cut from unbroken branches. Those from the Elm were picked up from beneath the tree, although there were hundreds of unbroken twigs on the tree, just out of reach, having apparently even more ice on them.

The ice-covered twigs were weighed and after the ice had melted a second series of weighings were made of the surface-dried twigs. The results may briefly be enumerated as follows:—

The weight added to the Lilac, when compared with the surface dried twig, ranged from 244 to 757 per cent., except in one case where a large portion of the twig was found to have been dead and dried before the icy coating formed; in this case the percentage was 1330. The percentage of additional weight in the case of the Apple was from 633 to 983, and in the Elm from 1133 to 2470.— J. Franklin Collins, Providence, Rhode Island.

Vol. 11, no. 121, including pages 1 to 16, was issued 13 February, 1909.



F. S. Collins ad nat. del.

Fig. 1. CLADOPHORA HOWEI
Figs. 2, 3. " MICROCLADIOIDES
Figs. 4, 5. CLADOPHORA CONSTRICTA
Fig. 6. " GRAMINEA

Gray's New Manual of Botany—7th Edition

An illustrated flora of the Northern United States and Canada east of the 96th meridian. By ASA GRAY, LL.D., late Professor of Natural History, Harvard University. Thoroughly revised and largely rewritten by BENJAMIN LINCOLN ROBINSON, Ph.D., Asa Gray Professor of Systematic Botany, and MERRITT LYNDON FERNALD, S.B., Assistant Professor of Botany, Harvard University, assisted by specialists in certain groups. With more than nine hundred text figures.

Regular Edition. Cloth, illustrated, 8vo, 928 pages. Price, $2.50.

Tourist's Edition. Limp leather, $5 \times 7\frac{1}{2}$ inches. Price, $3.00.

AMERICAN botanists, who have been impatiently awaiting the revision of this indispensable work, will be delighted to know that a seventh, completely revised, and copiously illustrated edition, is now ready. The revision has entailed years of work by skilled specialists. No effort or expense has been spared to attain the highest degree of clearness, terseness, and accuracy. The plant families have been rearranged in a manner to show the latest view of their affinities, and hundreds of species have been added to the flora. The nomenclature has been brought into thorough accord with the important international rules recently established—a feature of great significance. Indeed, the Manual is the only work of its scope which in the matter of nomenclature is free from provincialism and rests upon a cosmopolitan basis of international agreement. Nearly a thousand figures have been added, and scores of brief and lucid keys have been introduced in a manner which greatly simplifies the problem of plant identification. The work has been extended to include Ontario, Quebec, and the maritime provinces of Canada.

AMERICAN BOOK COMPANY

New York Cincinnati Chicago Boston

HOME GROWN LILIES.

Fresh from Beds. Wild Flowers, Hardy plants of all kinds.
Send for catalogue.

F. H. HORSFORD, Charlotte, Vt.

WASHINGTON'S FLORA.

A few complete sets and some incomplete ones of my Fascicle XII of Washington Plants are still on hand; also specimens of many species distributed in earlier fascicles. Send for lists.

W. N. SUKSDORF - - Bingen, Wash., U. S. A.

CAMBRIDGE BOTANICAL SUPPLY COMPANY,

WAVERLEY, MASS.

BOTANICAL SUPPLIES OF EVERY DESCRIPTION.

Samples of Driers and Mounting Papers sent on request.
ASK FOR NEW CATALOG, NO. 91.

STANDARD MATERIAL. IMMEDIATE SHIPMENT.

Physiological Instruments. How do Plants Work?

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3-4 in. 1 year $4.00, 6 months $2.50.

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB.

Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS
MERRITT LYNDON FERNALD
HOLLIS WEBSTER
} Associate Editors.

WILLIAM PENN RICH
EDWARD LOTHROP RAND
} Publication Committee.

Vol. 11. March, 1909. No. 123.

CONTENTS:

Emendations of Gray's Manual,— I.
B. L. Robinson & M. L. Fernald 33

Nature of Algal or Boghead Coals. *E. C. Jeffrey* 61

The Skunk Cabbage in an unusual Place. *William Brewster* . 63

Cryptogramma Stelleri in New Hampshire. *A. S. Pease* . . 64

Boston, Mass.
1052 Exchange Building.

Providence, R. I.
Preston and Rounds Co.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price $1.00 per year ($1.25 to all foreign countries including Canada); single copies 15 cents. Volume 1, $2.00, Vol. 2, $1.50. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

B. L. ROBINSON, Clement Circle, Cambridge, Mass.

Subscriptions, advertisements, and business communications to

W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

Single copies may be had from

E. L. RAND, Corresponding Sec'y N. E. Botanical Club,

1052 Exchange Building, Boston, Mass.

Entered at Boston, Mass., Post office as Second Class Mail Matter

---

SYNOPTICAL FLORA OF NORTH AMERICA, by A. GRAY and others. Vol. I. Fascicles 1 and 2. A critical treatment of forty-five families of polypetalæ (*Ranunculaceæ to Polygalaceæ*) 1895-1897. $5.20.—GRAY HERBARIUM of Harvard University, Cambridge, Mass.

NEW ENGLAND WILD FLOWERS AND THEIR SEASONS, by WILLIAM WHITMAN BAILEY. Price 75 cents net.—PRESTON & ROUNDS Co., Providence, R. I.

NOTICE

On and after April 1, 1907, the price of Volume 1, (1899) of RHODORA will be $2.00, and Volume 2, $1.50.

Complete sets of these two volumes are in very limited supply and will soon be exhausted. Volumes 3 to 8 can still be supplied at $1.00 each, unbound.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collectors' memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3-4 in. 1 year $4.00, 6 months $2.50.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 11. March, 1909. No. 123.

EMENDATIONS OF THE SEVENTH EDITION OF GRAY'S MANUAL,— I.[1]

B. L. Robinson and M. L. Fernald.

It is more than six months since the new edition of Gray's Manual was issued and a considerably longer time since the earlier portions of the work were cast. During this interval many annotations have been entered in the copies of the Manual used at the Gray Herbarium. Part of these notes correct errors — most of them happily of minor importance — which have been detected by members of the herbarium staff or reported by friends and correspondents. Others are of the nature of additions, extension of ranges, etc., being in most instances the result of information received since the issue of the Manual. In response to requests from several sources that such emendations as are collected at the Gray Herbarium should be brought together and from time to time published for general use, the present article has been compiled as the first of a possible series.

Supplements and addenda to works on systematic botany are in general inconvenient, both because they are likely to be overlooked and because such species, varieties, and notes as they contain rarely stand in any clear relation to the subject matter in the body of the work. For this reason it seems best to make all additions and changes in the well known form of *errata* from which those who desire can readily annotate their copies of the Manual and thus do much toward bringing them to date. If this course is followed the emendations will be found at the place and time they are needed.

[1] A limited number of reprints of this article, upon paper of the size of Gray's Manual (larger form), can be supplied by the management of Rhodora (Room 1052, Exchange Bldg., Boston, Mass.), postpaid, at 10 cents each.

Attention of correspondents is especially drawn to the fact that only such additions and changes are here presented as can be made with confidence and definiteness. Some valued notes have been received, which involve nice questions of judgment and consequently require further study before it is possible to express any confident opinion in regard to them. It is hoped that these matters may receive satisfactory solution and be duly recorded later. Such for instance are extensions of range where a slight doubt of identity is involved.

Regarding the corrections here brought together, it may be stated that the rather numerous cases in which generic names have lost their accents in the final impression of the Manual are due to a technical difficulty in the printing, these names having been in nearly all cases properly accented on the proofs. The insertion of many pre-Linnaean authorities not recorded in the Manual is here made in order to give a fair degree of uniformity in this rather difficult matter. The use of these bracketed authorities, though it has become customary in many scholarly works such as the Index Kewensis, Dalla Torre & Harms's Genera Siphonogamarum, etc., is a matter of sentiment rather than a scientific necessity. It is furthermore very difficult to carry out this practice with entire consistency. To attain some measure of uniformity in the matter, it has seemed best to employ these pre-Linnaean authorities only in cases where the earlier use of the name was at least partially in accord with the Linnaean and post-Linnaean application and in the second place not to attempt to carry these authorities back of the beginning of the 18th century. The publication of Tournefort's Institutiones in 1700, soon followed by the notable generic works of Rivinius, Ruppius, Dillenius, Vaillant, and some others, introduced a new epoch in plant-classification which for genera is almost as noteworthy as 1753 has become for species through the publication of Linnaeus's Species Plantarum.

The writers gratefully acknowledge aid from the collectors and other correspondents, who have kindly furnished many of the facts briefly recorded in the following emendations. Special assistance has been received from Dr. G. G. Kennedy and Dr. A. S. Pease, who have furnished lists of omitted accents and given scholarly aid in determining doubtful cases in the accentuation of the scientific names. Mr. B. F. Bush of Courtney, Missouri, has contributed an especially long and helpful list of extended ranges of plants growing in his state. Further notes and corrections of a similar kind may at any time be

addressed to the Gray Herbarium and will always be gratefully received and carefully investigated. In general such corrections, especially if they relate to extensions of range, should be accompanied by specimens.

Since the additional plants here mentioned as occurring within the range of the Manual were not actually included in the published work, it seems unwise to make on account of them any changes in the tabular summary on pages 23 to 27. Such statistical alterations of these tables can easily be made by users of the Manual if they desire to do so.

Where the following errata seem to need explanation this is added in bracketed paragraphs. Lines are counted from the top of the page, but the line of running page-heading is not included in the count.

Page 28, after line 7, insert: *A. Juss.*— **Jussieu**, Adrien de.

Page 29, line 24; for **Gussoni** read **Gussone**

after line 50, insert: *Juss.* *A. Juss.* **Jussieu**, Adrien de.

Page 34, line 57; *after* common *insert*: , especially northw.

Page 35, line 11; *for* Underw. *read* Keyserling.

[*Phegopteris Phegopteris* (L.) Keyserling, Polyp. et Cyath. Hb. Bung. 50 (1873); Underw. Mem. Torr. Bot. Club, v. 12 (1893).]

line 52; *for* vines *read* veins

Page 36, line 6; *for* Ky. *read* Mo. (*Bush*)

for line 37, substitute: Mo. (*Bush*), southw. and southwestw. (Mex.)

Page 37, lines 17 to 19; *for* Smooth, except some bristly-chaffy hairs on the midribs and especially on the *dark purple and polished stalk* and rhachis, 1–6 dm. high; *fronds* READ Dark purple or reddish brown polished *stipes and rhachises* decidedly *hairy* and harsh to the touch at least on one side; *fronds* 1–6 dm. high,

line 24; add: Var. BÚSHII Mackenzie. Stipes and rhachises essentially glabrous. (*P. glabella* Mett.) — Range of the typical form.

line 32; add as synonym: CRYPTOGRAMME Hook.

Page 39, line 8; *for* Forma *read* Var.

Page 40, line 48; *for* Var. SCHWEINÍTZII (Beck) Small (*Aspidium acrostichoides*, var. *incisum* Gray) *read* Var. INCÌSUM Gray

(*Aspidium acrostichoides*, var. Gray; *Polystichum acrostichoides*, var. *Schweinitzii* Small)

[This change is required by Articles 48 and 49 of the Vienna Rules, which necessitate the adoption in the varietal category of the name *incisum*, this being the earliest varietal designation of the plant in question. The synonymy of this plant is as follows: *Aspidium Schweinitzii* Beck, Bot. N. and Mid. St. 449 (1833). *A. acrostichoides*, *β. incisum* Gray, Ann. Lyc. N. Y. iii. 238 (1835). *Polystichum acrostichoides*, var. *incisum* Gray, Man. 632 (1848). *P. acrostichoides*, var. *Schweinitzii* (Beck) Small, Bull. Torr. Bot. Club, xx. 464 (1893); Robinson & Fernald in Gray, Man. ed. 7, 40 (1908), by nomenclatorial error.]

Page 41, line 62; *omit*: ; reported from Mo.

[Mr. B. F. Bush writes that the specimens which formed the basis of the report of *Aspidium simulatum* from Missouri were incorrectly determined.]

Page 42, line 18; after Aug. *insert*: Forma Davenpórtii (Floyd) Eastman has some of the pinnae cristate-forked at the tip.— E. Mass. (*Floyd*) and probably elsewhere.

Page 43, line 23; *for* Hook. *read* Gray.

[The combination *Aspidium spinulosum*, var. *dilatatum* (Hoffm.) was merely implied by Hooker, Brit. Fl. 444 (1830). It seems to have been first actually made by Gray, Man. ed. 2, 597 (1856).]

line 30; after *tripinnate* insert: , less enduring

line 32; *for* Concord, Mass. (*Purdie*). *read* Concord (*Purdie*) and Lexington (*W. Faxon*), Mass.

Page 45, line 8; *for* westw. to Minn. *read* westw. to Mo. and Minn.

line 22; for 1–3 read 1–5

line 29; *for* Mett. *read* (Willd.) Mett.

Page 46, line 22; over the first **A** of **OSMUNDACEAE** insert a grave accent.

Page 48, line 31; *for* Lasch *read* (Lasch) Milde

Page 49, line 4; *for* var. *read* forma

Page 50, line 35; *after* southw. *insert*: naturalized on Pecowsic Brook and Connecticut River near Springfield, Mass. (*Mrs. Owen*).

Page 54, line 34; *for* L. *read* [Rupp.] L.

Page 55, line 63; *after* Mts., *insert*: bluffs,
lines 63 and 64; *for* s. to S. C. and Ala. *read* Mo., Ala., and S. C.

Page 64, line 50; over the **A** of **LARIX** insert a grave accent. *For* Adans. *read* Mill.

Page 66, line 53; add as synonym: THUYA [Tourn.] B. Juss.

Page 69, lines 2 and 3; *for* N. S. and Me. *read* e. Que.

Page 70, line 10; *for* Dioecious *read* Monoecious or dioecious

Page 72, line 56; for *P. Nuttallii* read *P. Nuttalii*
[This was the original form of the name.]

Page 74, line 7; *for* Merat *read* Mérat

Page 79, line 13; over the first **A** of **NAJAS** insert a grave accent.
line 23; add as synonym: NAIAS B. Juss.
line 45; *for* Pa. *read* Nantucket, Mass. (*Bicknell*)

Page 80, line 17; *for* L. *read* [Rivinius] L.

Page 81, line 11; over the second **A** of **SAGITTARIA** [if, as in some copies, lacking an accent] insert a grave accent.

Page 88, line 49; for **Heleochloë** read **Heleochloa**

Page 96, line 47; for **AMPHICARPON** read **AMPHICARPUM**, which should bear the acute accent over the second **A**.

Page 98, line 5; *after* Ill., *insert*: Mo. (*Bush, E. J. Palmer*),
line 51; *for* s. N. Y. *read* Nantucket (acc. to Bicknell)

Page 99, line 26; *before* Del. *insert*: Cape May Co., N. J. (according to W. Stone) and
line 38; *for* Md. and Ky. to N. C. and Tex. *read* Md., Ky., and s. w. Mo. (*E. J. Palmer*) to Tex. and N. C.

Page 103, line 9; *before* Del. *insert*: Cape May Co., N. J. (according to W. Stone) and

Page 106, lines 32 and 57; *for* se. *read* s. e.

Page 107, line 9; *for* se. *read* s. e.
line 20; *for* Ct. *read* Nantucket (acc. to Bicknell)
line 45; *for* Ct. *read* e. Mass.

Page 110, line 13; *for* Ct. *read* e. Mass. (*Wiegand*)

Page 114, lines 19, 35, and 46; *for* se. *read* s. e.

Page 116, line 12; *for* N. J. to I. T. *read* Mass. (*Mrs. C. I. Cheney*) to Okla.

Page 117, line 19; *for* se. *read* s. e.
line 31; *for* Va. to I. T. *read* Cape May, N. J. (according to W. Stone) and Va. to Okla.

Page 118, line 39; *for* Ct. *read* s. e. Mass. (*Rich*)
line 56; *after* U. S. *insert*: , s. Ont. (*Klugh*), and reported northeastw. to N. S.

Page 119, line 6; *add*: (Nat. from Eu.)
line 22; *before* Del. *insert*: near Cape May, N. J. (according to W. Stone),

Page 121, line 17; *add*: (Adv. from the Old World.)

Page 126, line 29; *for* Del. to Tex. and I. T. *read* s. N. J. (according to W. Stone) and Del. to Fla. and Okla.

Page 128, line 46; *for* N. Y. *read* Mass. (*Rich*)
line 48; over the **E** of **PHLEUM** insert a grave accent.

Page 133, line 20; *for* N. J. *read* Nantucket, Mass. (according to Bicknell)

Page 135, line 37; *for* cm. *read* dm.

Page 138, line 44; *before* Vt. *insert*: e. Mass. and

Page 144, line 1; over the first **A** of **BECKMANNIA** insert an acute accent.
line 17; *after* ground, *insert*: n. w. Wisc. (according to Cheney),

Page 145, line 42; *after* southwestw. *insert*: ; occasionally adventive eastw.

Page 147, line 20; *after* fields, *insert*: Mass.,
line 38; *for* n. Ill. *read* Wisc. (according to Cheney)
line 55; *after* southw. *insert*: occasionally adventive in waste places northw.

Page 149, line 18; *for* Ct. *read* N. H. (*Batchelder*)
line 23; *for* southw. *read* Mo. (*Bush*), southw. and southeastw.

Page 150, line 18; *for* Vt. *read* Me.
line 27; *for* Fisch, *read* Fisch.,
line 33; *for* Mass. *read* s. N. H. (*Batchelder*)

Page 152, line 46; *before* n. Mich. *insert*: Bruce Peninsula, Ont. (according to Klugh),

Page 153, line 47; in **DISTICHLIS** transfer the accent to the first **I**.

Page 159, line 37; *for* Me. *read* Mass.

Page 164, line 37; *for* w. N. E. *read* N. E.

Page 166, line 6; add as synonym: Agropyrum R. & S.
line 43; *for* Me. *read* Cape Breton I. (*Churchill*) to Cape Cod, Mass. (*F. S. Collins*).

[There is increasing evidence that *Agropyron pungens* is indigenous on our coast.]

Page 169, line 17; *before* O. *insert*: Mass.;
line 25; *for* Ct. *read* Mass.

Page 173, line 27; for *Aristatus* read *aristatus*

Page 176, line 1; *before* Del. *insert* Cape May, N. J. (according to W. Stone) and
line 41; *after* adv. *insert*: in Mo. (*Bush*) and

Page 177, line 13; *for* Rich. *read* Richard.

Page 180, line 2; *after* Ill., *insert*: Mo. (*Bush*),

Page 181, line 48; *for* Mich. *read* Wisc. (according to Cheney)
lines 49 and 55; *before* FIG. *insert*:— Sometimes bearing tubers.
line 54; *for* Ct. *read* e. Mass.

Page 182, line 2; *before* Va. *insert*: Cape May, N. J. (according to W. Stone) and

Page 183, lines 23 and 24; *for* Var. VÌGENS Bailey *read* Var. MÀJOR Sonder.
line 25; *before* — *insert*: (Var. *vigens* Bailey.)

[*Heleocharis palustris, β. major* Sonder, Fl. Hamb. 22 (1851). *Eleocharis palustris*, var. *vigens* Bailey in Britton, Journ. N. Y. Micros. Soc. v. 104 (1889).]

Page 184, line 31; *before* N. Y. *insert*: Muddy shores, Nantucket, Mass. (*Mrs. N. F. Flynn, Bicknell*);

Page 186, line 26; in **FIMBRISTYLIS** for the acute accent over the **I** substitute a grave accent over the **Y**.

[*Stylus*, the New Latin botanical term for style is derived from the Greek στῦλος (a column) or its diminutive στυλίς, both of which have a long penultimate vowel. The word is said not to be connected with the Latin *stilus* (a pencil), which has a short penultimate vowel.]

Page 190, line 40; *after* Que. *insert*: ; also Nfd. (*Eames & Godfrey*).

Page 191, line 38; *add*: Var. CONTÓRTUS Eames. More slender; spikelets twisted or bent, linear-cylindric; involucral leaf longer.— Brackish marsh, Milford, Ct.

Page 194, line 7; after (*Haberer*) insert: ; also centr. Me.

Page 196, line 51; *before* South Ashburnham *insert*: Washington Co., Me. (*Cushman*);

Page 198, line 14; *for* Britton *read* Pax

[*Hemicarpha micrantha* (Vahl) Pax in Engl. & Prantl, Nat. Pflanzenf. ii. Abt. 2, 105 (1887); Britton, Bull. Torr. Bot. Club, xv. 104 (1888).]

Page 199, line 12; add as synonym: RHYNCHOSPORA R. Br.

Page 200, line 7; after (*C. F. Parker*); insert: Nantucket (*Bicknell*); line 38; *before* Del. *insert*: Burlington Co., N. J. (according to W. Stone) and

Page 210, line 55; for *C. typhinoides* read *C. typhina*

Page 212, line 37; for *C. glauca* read *C. flacca*

Page 216, line 17; for *C. typhinoides* read *C. typhina*

Page 219, line 37; *for* n. N. E. *read* n. and w. N. E.

Page 226, line 49; for *mm.* read *cm.*

Page 237, line 29; *for* **C.** GLAÚCA Scop. *read* **C.** FLÁCCA Schreb.

[*C. flacca* Schreb. Spicil. 669 (1771). *C. glauca* Scop. Fl. Carn. ed. 2, ii. 223 (1772).]

line 39; *after* scales. *insert*: (*C. glauca* Scop.)

under Fig. 457; *for* C. glauca *read* C. flacca

Page 248, line 19; *for* and Mich. *read* Mich., and Wisc. (according to Cheney).

Page 250, line 48; for **C. typhinoìdes** Schwein. read **C. typhìna** Michx.

line 52; *after* ascending. *insert*: (*C. typhinoides* Schwein.)

under Fig. 531; *for* C. typhinoides *read* C. typhina

[This change is rendered necessary by a recent examination of Michaux's type material, which shows it to have the blunt scales characteristic of the species. Both *C. typhina* Michx. (1803) and *C. typhinoides* Schwein. (1824) have until recently been treated as identical with *C. squarrosa* L., but the blunt-scaled plant has of late been taken up as a distinct species.]

Page 260, line 40; over the second **A** of **ERIOCAULACEAE** insert a grave accent.

Page 261, line 26; *for* **E. articulàtum** (Huds.) Morong. *read* **E. septangulàre** With.

line 31; for *E. septangulare* With. read *E. articulatum* Morong, in part.

[The well known name *E. septangulare* With. may be reëstablished. *E. articulatum* (Huds.) Morong was taken up under the impression that *E. septangulare* was first published in Withering's Arr. Brit. Pl. ed. 3, ii. 184

(1796), the earlier description of the species in Withering's Bot. Arr. Veg. ii. 784 (1776), having been overlooked owing to the circumstance that there are by a typographical error two pages numbered 784 in the work in question. The description of *E. septangulare* in 1776 makes it clearly antedate *Nasmythia articulata* Huds. Fl. Ang. ed. 2, 415 (1778). Even if *E. septangulare* had not proved the earlier name, it is doubtful if *E. articulata* (Huds.) Morong could be adopted for our plant, since of Hudson's treatment only the citation of locality (Isle of Skye) relates to *E. septangulare* and all descriptive and synonymic matter is taken directly from Linnaeus's description of his *E. decangulare.*]

Page 264, line 55; *for* Pa. *read* Mo. (*Bush, E. J. Palmer*)

Page 265, line 25; *for* 5 *read* 12

line 28; *after* Mass. *add*: and Vt.

line 31; *for* I. T. *read* Mo. (*Bush*), Okla.

Page 268, line 21; omit: 3. *J. Gerardi.*

after line 21, insert:

Anthers about thrice the length of the filaments; capsule ellipsoid-ovoid, equaling or but slightly exceeding the perianth 3. *J. Gerardi.*

Anthers scarcely longer than the filaments; capsule globose-obovoid, distinctly exserted . . . . 3a. *J. compressus.*

line 72; *after* 4 *insert*: — 5

Page 269, before line 1, insert:

Capsules 2–3 mm. long.

after line 4, insert:

Capsules 4–5 mm. long . . . . 41a. *J. longistylis.*

Page 270, line 53; *before* s. N. Y. *insert*: n. N. H. (*Pease*) and

line 55; *before* cyme *insert*: *leaves deep green*;

after line 60, insert:

3a. **J. comprèssus** Jacq. Similar, but usually lower and stouter, *glaucous*; auricles and margins of the sheaths thinner and more delicate than in no. 3; cyme usually overtopped by the elongate bract; perianth usually paler and the *globose-obovoid distinctly exserted capsule* usually darker than in no. 3; *filaments nearly equaling the anthers.* —Open soil from Murray Bay (*Eggleston*) to Quebec (*Pease*), Que.; possibly naturalized from Eu. July, Aug. (Eurasia.)

Page 271, line 3; *for* 3–4 mm. *read* 0.3–0.4 mm.
line 22; *for* 3.5–5 mm. *read* 0.35–0.5 mm.
line 50; *for* 3.5–4.5 *read* 0.35–0.45

Page 272, line 8; *for* Mass. *read* s. Me. (*Miss Furbish*)

Page 273, line 3; *after* Great Lakes *insert*: Mo. (*Bush*),

Page 275, line 3; in **subtilis** for the acute accent over the **u** substitute a grave accent over the first **i**.

Page 278, after line 11, insert:

41a. **J. longistỳlis** Torr. Stems (2–7 dm. high) from slender creeping rootstocks; *leaves linear, pale green*; cymes loose or dense, of 2–10 hemispherical heads; *bracts conspicuous, whitish and scarious*; *flowers about 5 mm. long*; sepals and petals greenish or castaneous with white scarious margins; capsule abruptly slender-beaked; *seeds* ellipsoid, 0.5 *mm. long*.—Damp sandy or gravelly shores and prairies, w. Nfd. (*Eames & Godfrey*); Detroit R., Ont. (*Macoun*); Man. to B. C., s. to Neb., N. Mex., Ariz., and s. Cal. June–Aug.

Page 283, line 35; *for* Gaspé Co., Que. *read* Nfd.

Page 284, line 20; for **ZYGÁDENUS** read **ZIGÁDENUS**

[This name was originally published as *Zigadenus* in Michaux's Fl. i. 213 (1803), and was taken up in this form by many authors including Dr. Gray, Ann. Lyc. N. Y. iv. 111 (1837). In 1837 Endlicher (Gen. 135) altered the spelling to *Zygadenus*, a form which has been pretty generally accepted. The change is certainly in the direction of philological accuracy and from the literary point of view may seem justifiable, but it belongs to a class of alterations which, if permitted in one case, lead by exceedingly slight gradations to changes of greater and greater magnitude, which, dependent solely upon varying taste and judgment, would seriously menace the stability of nomenclature. These changes are rendered the more undesirable from the impossibility of citing (truthfully) the original author as the authority for the altered form of the name. One would thus in the present instance be obliged to write *Zygadenus* Endl. for technically there was no *Zygadenus* Michx.]

Page 290, line 14; *for* s. N. Y. *read* Ct. (*Graves*)

Page 295, line 55; *omit*: Nantucket, Mass.

[The sterile specimens upon which *Smilax Bona-nox*

has been reported from Nantucket prove to be *S. rotundifolia*, var. *quadrangularis*. See Bicknell, Bull. Torr. Bot. Club, xxxvi. 10 (1909).]

Page 303, line 51; for *scarcely exserted* read: more or less exserted

Page 309, line 2; *before* Del. *insert*: Cape May Co., N. J. (according to Long) and

Page 316, line 48; *for* R. Br. *read* Chatelain.

Page 317, line 30; *after* Pa. *insert*: to Mo. (*Bush*),

line 44; *for* and Ont. *read* , Ont., and Gaspé Co., Que.

Page 319, lines 37 and 38; *for* A southern species extending northw. to N. J. *read* Woods, N. J. and e. Pa. to Fla. and La.; also Cuyahoga Co., O. (*Bassett*).

line 38; *for* northw. *read* northeastw.

Page 325, lines 53 and 54; omit: *scales pale brown or yellowish*;

line 54; *for* 4–6 *read* 5–8

Page 326, line 2; *before* capsule *insert*: *scales* oblong-spatulate, *brown or yellowish*;

line 3; *after* blunt *insert*: , 6.5–8 mm. long

between lines 4 and 5; insert:

20a. **S. subserícea** (Anders.) Schneider. Similar; leaves loosely sericeous when young, at length glabrate except the *puberulent midrib above,* rather coarsely appressed-serrate; winter buds puberulent; *scales* oblong, *with rounded blackish tips;* capsule lance-conic, blunt, loosely silky, 5–7 mm. long, its pedicel many times exceeding the gland.— Large widely branching shrub of low grounds, e. Mass. (*Emerson, Forbes*) to N. Y.

Page 327, line 20; *before* Penobscot *insert*: St. John R. and

Page 350, line 27; *before* Great Lakes *insert*: L. Champlain,

line 36; *after* N. B. *insert*: e. Me. (*Knowlton*)

Page 351, line 34; *for* n. Mich. (*Wheeler*) *read* Wisc. (*Wadmond*)

Page 352, line 54; *for* w, *read* w.

Page 356, line 30; *after* southw. *insert*: ; occasionally adventive eastw.

Page 357, line 18; omit: *spreading by running rootstocks,*

between lines 18 and 19; insert:

* *Erect from a caudex and deep tap root; sepals enlarged and wing-margined in fruit.*

between lines 32 and 33; insert:

* * *Freely spreading by slender elongated roots bearing adventitious buds; sepals scarcely enlarged in fruit.*

Page 363, line 17; *for* [Tourn.] L. *read* [Tourn.] Hill.

Page 367, line 3; *for* Stem angled, much branched *read*: *Stem angled,* simple to much branched, *usually reddish*

line 9; *after* dwarf; *insert*: *stem whitish, terete*;

line 31; *add*: (Nat. from Eu.)

Page 369, line 41; *before* e. Que. *insert*: Nfd. and

Page 370, line 41; *for* Neb. *read* Mo. (*Canby*)

Page 371, line 30; add as synonym: AMARANTUS L.

line 52; *after* ground. *insert*: (Introd. from Trop.)

Page 374, line 22; *after* Tex. *add*: ; established along railroads, Mo. (according to Bush).

line 23; over the **E** in **GOMPHRENA** insert a grave accent.

Page 378, line 51; *for* Don *read* G. Don

Page 382, line 42; *for* Introd. *read* Nat.

line 43; *after* situations. *add*: (Nat. from Eu.)

line 57; for PRÓCERA read PROCÈRA

Page 383, line 4; *after* Ont. *insert*: ; on moist soil and in water, Pownal, Vt. (*Woodward*).

Page 384, line 28; for **L.** CORONÀRIA read **L.** CORONÀRIA

Page 385, line 43; *after* grounds. *add*: (Nat. from Eu.)

Page 386, line 52; *for* Adv. *read* Nat.

Page 389, line 5; in **PORTULACA** change the accent from acute to grave.

Page 403, line 36; *for* and southw. *read* to Fla., Tex., and Mo.

Page 408, line 8; *after* green *add*: to dark purple

Page 410, line 8; for **ANONÀCEAE** read **ANNONÀCEAE**

Page 411, line 45; over the **Y** in **PODOPHYLLUM** insert an acute accent.

Page 416, line 24; *for* L. *read* [Tourn.] L.

line 39; over the second **A** in **FUMARIACEAE** insert a grave accent.

Page 417, line 34; *after* white *insert*: or pink

Page 418, line 21; *after* Kan. *insert*: Okla. (*Brainerd*),

Page 420, for lines 5 and 6, substitute:

15. **Brassica**. Seeds in a single row, subglobose.
16. **Diplotaxis**. Seeds in 2 rows, ovoid. Style cylindrical, about 2 mm. long.

16a **Eruca**. Seeds in 2 rows, ellipsoidal. Style gladiate, about 8 mm. long.

Page 421, for line 19, substitute:

Seeds 2-rowed in each cell.
Style cylindric, about 2 mm. long . . . 16. DIPLOTAXIS.
Style gladiate, about 8 mm. long . . . . . 16a. ERUCA.

for line 72, substitute:

Fruit thickish, 4–7 mm. in diameter.
Fruit indehiscent; seeds in 1 row . . . 14. RAPHANUS.
Fruit dehiscent; seeds in 2 rows . . . . 16a. ERUCA

Page 426, line 13; *for* Ludwig *read* [Knaut] Ludwig

Page 429, after line 6, insert:

16a. **ERÙCA** [Tourn.] Adans.

Pods thickish, somewhat 4-sided, tipped with a large style persisting as a flattish triangular-lanceolate beak. Seeds ellipsoidal, slightly compressed, arranged in 2 rows. — Annuals or biennials, with pinnatifid leaves and rather large flowers; the petals ocroleucous to yellowish or purplish, with violet veins. (The classical Latin name, used by Pliny; its derivation not clear.)

1. **E.** SATÌVUM Mill. Coarse erect annual; petals 2 cm. long; pods fusiform, 4-angled, erect on short stout pedicels.— Waste places and cultivated grounds, becoming established at several widely separated stations. (Adv. from the Old World.)

Page 429, line 7; *for* [Heist.] Link. *read* [Heist.] Adans.

[Although Adanson, Fam. ii. 418 (1763) spelled this name *Couringia* he clearly attributed it to Heister, who in his Ind. Pl. Rar. 34 (1730) published it as *Conringia*, dedicating it to Dr. Hermann Conring. It is clear therefore that *Couringia* was merely a typographical error, which may be corrected in accordance with Art. 57 of the Vienna Rules, and Adanson may be quoted as the first post-Linnaean authority for the genus.]

line 45; *for* Me. *read* N. E.

Page 431, line 16; *after* westw. *insert:* ; locally adventive eastw.

Page 438, line 25; *for* e. Mass. and Vt. *read* w. Me. (*Miss Furbish*)

Page 438, for lines 33–36, substitute:

* Petals entire or merely emarginate.

1. **Polanisia**. Pods scarcely or not at all stiped. Petals emarginate. Stamens 6–∞
2. **Cleome**. Pods long-stiped. Petals entire. Stamens 6.

* * Petals laciniately toothed.

3. **Cristatella**. Pods on rather short but slender stipes. Stamens 6–14.

Page 439, after line 16, insert:

3. **CRISTATÉLLA** Nutt.

Petals cuneately short-clawed, more or less irregularly laciniate or lacerate-fringed. Ovary declined. Capsules somewhat compressed, linear, erect, on divergent pedicels. Seeds cochleate-reniform.— Weak viscid annuals, with petiolate palmately 3-foliolate leaves. (Name from *crista*, a crest, presumably alluding to the fringe-toothed petals.)

1. **C. Jamèsii** T. & G. Erect, 1–3 dm. high; leaflets linear; flowers small; petals pale yellow, 2–3 mm. long.— Sandy places, Ill. (acc. to Gleason) to Neb. Tex., and w. La.

Page 441, line 43; add as synonym: PODOSTEMON Michx.

Page 443, line 26; *after* Ala. *insert:* Mo. (*Bush*),

Page 443, line 39; for **S.** PURPÙREUM Tausch read **S.** TRIPHÝLLUM (Haw.) S. F. Gray

[*Sedum Telephium, β. purpureum* L. Sp. Pl. i. 430 (1753). *Anacampseros triphylla* Haw. Syn. Pl. Succ. 111 (1812). *Sedum purpureum* Link, Enum. i. 437 (1821); Tausch, Flora, xvii. 515 (1834). *Sedum triphyllum* S. F. Gray, Nat. Arr. Brit. Pl. ii. 540 (1821). *Sedum Fabaria* Koch, Syn. 258 (1837). *S. Telephium* of Am. auth., not L.]

Page 443, line 47; *after* locally *insert*: on Mt. Horrid, Vt. (*D. L. Dutton*),

Page 443, line 49; *for* L. *read* [Rupp.] L.

Page 445, line 3; *for* Mt. *read* Mountain

Page 449, line 36; omit: (according to Wheelock).

[Characteristic material of *Parnassia grandiflora*, collected by Mr. B. F. Bush in Shannon County, Missouri, has been examined.]

Page 450, line 22; *after* radiant *insert*: (Var. STÉRILIS T. & G., in cultivation called "HILLS OF SNOW")

Page 451, line 20; for *R. floridum* read *R. americanum*

line 32; for *R. aureum* read *R. odoratum*

line 66; for **R. flóridum** L'Hér. read **R. americànum** Mill.

[*Ribes americanum* Mill. Dict. ed. 8, no. 4 (1768). *R. floridum* L'Hér. Stirp. Nov. 4 (1784).]

Page 452, line 3; after *long.* insert: (*R. floridum* L'Hér.)

line 42; *for* Vt. *read* n. w. Mass. (*Burnham*)

line 43; *for* **R. aúreum** Pursh *read* **R. odoràtum** Wendland

line 45; *for* 3–4 *read* 2–3

line 46; *for* yellow or black. *read* black. (*R. aureum* auth., not Pursh.)

Page 456, line 55; *for* Borkh. *read* (Ait.) Borkh.

Page 459, line 2; *for* centr. Me. *read* Nfd. (*Eames & Godfrey*)

line 8; before *Aronia* insert *P. arbutifolia*, var. Hook.;

Page 460, line 4; FOR Var. **Botryàpium** (L. f.) T. & G. *Leaves* READ Var. **toméntula** Sarg. Leaves (less inclined to reddish or brownish color)

lines 17 and 21; *for* C. Koch *read* K. Koch

line 36; *for* L. *read* [Tourn.] L.

line 50; *for* taxomic *read* taxonomic

Page 462, for line 18, substitute:

1. **C.** MONÓGYNA Jacq. (ENGLISH H.) Characters of the section. (*C. Oxyacantha* of Am. auth., not L.) — Sparingly

Page 472, line 13; *for* C. Koch *read* K. Koch

Page 476, line 2; *for* cm. *read* mm.

Page 481, for line 15, substitute:

Leaves pinnate, of numerous leaflets.
Achenes dorsally sulcate; stolons, peduncles, etc., pubescent 17. *P. Anserina.*
Achenes not sulcate; stolons, etc., glabrous or glabrate 17a. *P. pacifica.*

line 52; *after* woolly *insert*: , arachnoid-villous

for line 61, substitute:

form cymes.
Cauline leaves 2–5 below the inflorescence 9. *P. Nuttallii.*
Cauline leaves 8–12 below the inflorescence . 9a. *P. canescens.*

Page 483, after line 10, insert:

9a. **P.** CANÉSCENS Bess. Similar; stem grayish-lanate, 2.5–5 dm. high; leaflets decidedly paler and grayish-pubescent beneath; inflorescence also grayish-pubescent. (*P. inclinata* auth., not Vill.) — Roadsides, w. N. Y. and Ont. (Nat. from Eu.)

line 38; *after* below *insert*: , more or less minutely pilose and glandular at summit

line 39; *after* serrate, *insert*: dark green and glabrous or glabrate above,

Page 483, line 42; *add*: Var VILLÒSA (Pers.) Lehm. Branches, stipules, peduncles, and calyx densely villous and glandular; leaflets silky above, at least the younger glandular-villous on the midrib beneath.— Throughout the St. Lawrence system from n. N. S. and e. Que. to L. Superior and L. Winnepeg. (Greenl., n. Eu.)

Page 484, for lines 3–14, substitute:

17. **P. Anserìna** L. (SILVER WEED.) Spreading by slender many-jointed runners; the *stolons, peduncles, petioles, and rhachises* more or less *pubescent* with ascending or loosely spreading hairs; leaves all radical, interruptedly pinnate; leaflets oblong, oblanceolate, or obovate, sharply serrate, silky-tomentose beneath, at least the younger lustrous; peduncles elongated; bractlets often cleft; *achenes* thick-ovoid to subglobose, more or less corky, *dorsally sulcate*. (*Anserina* Rydb.)— Gravelly or sandy shores and banks, e. Que. to Alaska, s. to P. E. I., N. B., Me., Vt., N. Y., Ind., centr. Ill., Ia., N. Mex., and s. Cal. June–Aug. (Eurasia.)

Var. **serícea** Hayne. Leaflets silvery-sericeous on both surfaces. (Var. *concolor* Ser.; *Anserina concolor* and *A. argentea* Rydb.)— Of similar range, more abundant westw.

17a. **P. pacífica** Howell. Similar in habit; *stolons, peduncles, petioles, and rhachises glabrous* or early glabrate; leaflets white-tomentose beneath with opaque hairs; bractlets usually simple; *achenes* laterally compressed, firm, rounded on the back, not *sulcate*. (*P. Anserina*, var. *grandis* T. & G.; *Anserina grandis, pacifica*, and *litoralis* Rydb.)— Brackish and saline soils, chiefly along the coast, Greenl. and Lab. to [L. I.;] also on the Pacific coast. (E. Asia.)

line 17; for *apparently* read *generally appearing*

line 19; *for* coast of Me. *read* Me.

Page 485, at the end of line 5, add: Var. DENUDÀTA (Hayne) Maxim. Leaves green and glabrate beneath.— Locally established in N. E. (Introd. from Eurasia.)

lines 34 and 41; before *leaves* insert: *basal*

Page 487, line 24; *after* Forma PÁLLIDUS (Bailey) Robinson *insert*: , n. comb. (*R. occidentalis*, var. *pallidus* Bailey, Cycl. Am. Hort. 1582)

[This, it is believed, is the only new combination in the Manual. It was the intention of the editors to

publish all new combinations in advance, recording them in botanical journals where the new species and varieties could be accompanied by proper Latin diagnoses and the new names by adequate bibliographical and synonymic citations. In this single instance the new combination was overlooked and appeared for the first time in the Manual. The transfer of Prof. Bailey's variety to formal rank was made in order to bring this minor variation into accord with color-forms as elsewhere treated in the Manual.]

Page 493, line 11; *after* Minn. *add*: and in the mts. to N. C. (*House*).

Page 496, line 60; *for* w. to Minn. and Miss. *read* w. to Minn., Ia., Mo., and Miss.

Page 497, line 24; *after* pedicels *insert:* nearly equaling or
for line 28, substitute:

e. Bracts scalelike, not petioled *f.*
f. Leaves lanceolate to oblong, ovate, or obovate *g.*

lines 29 and 40; for *f.* read *g.*
for lines 44–47, substitute:

f. Leaves suborbicular . . . . 9. *P. Gravesii.*
e. Bracts leaflike though small, petiolate . 8. *P. Mahaleb.*

Page 500, line 9; for **Abizzia** read **Albizzia**

Page 503, line 12; over the **i** of **hirta** insert an acute accent.

Page 504, line 29; add as synonym: Gleditschia Scop.

Page 506, line 5; *for* N. H. *read* Me. (*Miss Furbish*)

Page 507, line 33; *after* La. *insert*: ; and northw. in Miss. basin to Mo. (*Bush*).

Page 508, line 36; *after* sutures *insert*: (or by a lid in *T. pratense*)

Page 510, line 6; over the **O** of **MELILOTUS** insert a grave accent.
line 44; *for* Huds. *read* (L.) Huds.

Page 515, line 1; over the **E** of **WISTERIA** insert a grave accent.

Page 518, line 29; *for* L. *read* [Tourn.] L.

Page 525, line 28; *for* Va., Okla., and southw. *read* Va. to Ala., Tex., and Mo. (*Bush*).

Page 526, line 22; *for* **V.** angustifòlia (L.) Reichard *read* **V.** angustifòlia Reichard
line 53; after *Glabrous* insert: or nearly so

Page 527, line 1; over the **A** of **LATHYRUS** insert an acute accent.
line 31; *for* e. Me. *read* e. Mass. (*Wiegand*).

Page 530, line 10; add as synonym: Amphicarpaea DC.
line 41; add as synonym: Dolicholus Medic.
line 47; *after* oblong. *insert*: (*Dolicholus* Vail.)
line 50; *after* corolla. *insert*: (*Dolicholus* Vail.)
line 55; *after* pedunculate. *insert*: (*Dolicholus* Vail.)
Page 531, line 3; before *R. reniformis* insert: *Dolicholus* Vail;
line 11; for **Millegrana** read **Radiola**
Page 532, line 21; *for* Vt. *read* s. Me. (*Chamberlain*)
line 26; for **MILLEGRÀNA** Adans. read **RADÌOLA** [Dill.] Hill.
line 31; *for* Radiola Roth. *read* Millegrana Adans.
for line 32, substitute:

1. **R.** Linoìdes R. The only species. (*M. Radiola* Druce.)

[*Radiola* [Dill.] Hill, Brit. Herb. 227 (1756). *Millegrana* Adans. Fam. ii. 269 (1763).]

Page 533, line 60; for *O. Brittonae* read *O. Brittoniae*
Page 536, line 36; over the **E** of **KALLSTROEMIA** insert a grave accent.
Page 540, line 20; *after* Mich., *insert*: Mo. (*Blankinship, Bush*),
Page 542, line 19; *after* Kan. *add*: ; rarely on ballast, etc., in N. E.
Page 544, line 49; over the **a** of **Phyllanthus** insert an acute accent.
Page 549, line 10; *for* e. Que. *read* Nfd.
after line 37, insert:

29a. **E.** exígua L. Erect annual, simple or branched from the base; stem slender; *stem-leaves linear, the floral ones lanceolate;* umbel 3–5-rayed, rays simple or freely forked; glands with short slender horns; capsule obtusely angled; seeds quadrangular-ovoid, tuberculate, about 1 mm. long.— Waste places and cultivated ground, local, Cape Breton I. (*Eames & Godfrey*); Buffalo, N. Y. (*D. F. Day*); and on ballast southw. (Adv. from Eu.)

Page 555, line 50; add as synonym: Nemopanthes Raf.
Page 556, line 1; over the second **A** of **CELASTRACEAE** insert a grave accent.
line 24; add as synonym: Euonymus L.
Page 557, line 31; over the second **A** of **ACERACEAE** insert a grave accent.
Page 562, line 6; *for* rarely *read* or

Page 563, line 15; *for* Vt. *read* Me.

line 48; *for* "Mo." *read* Mo.

[Mr. B. F. Bush has sent characteristic material of *Cissus incisa* from several stations in Missouri.]

line 49; over the first **I** in **VITIS** insert a grave accent.

Page 566, line 42; *after* etc. *insert*: , and in cultivated fields westw.

Page 568, line 5; *for* Cav. *read* (L.) Cav.

line 20; before *sessile* insert: partly

between lines 50 and 51, insert:

1a. **C. Búshii** Fernald. *Stem erect, retrorsely hirsute* and minutely stellate-puberulent, 5 dm. high, from a napiform root; leaves suborbicular to broadly ovate, the lower with 5–7 oblong or obovate coarsely toothed lobes, the upper slightly 3-lobed; peduncles 1-flowered; bractlets ovate; calyx-lobes narrowly lanceolate; petals purple, 2–2.5 cm. long, truncate, erose-denticulate; carpels rugose-reticulate.— Woods, s. w. Mo.

[**Callirhoë Bushii** Fernald, n. sp., perennis erecta; radice napiformi; caule ca. 5 dm. alto retrorse hirsuto et minute stellato-puberulo; foliis utrinque viridibus hirsutis cordatis petiolatis, radicalibus 6–10 cm. diametro suborbicularibus 5–7-lobatis vel -partitis, lobis oblongis vel obovatis obtuse vel acute super mediam partem paucidentatis, petiolis 1.5 dm. longis retrorse hirsutulis; foliis caulinis superioribus late ovatis plus minusve trilobatis, lobis grosse paucidentatis; stipulis ovatis obtusis 1–1.3 cm. longis hirsuto-ciliatis; pedunculis hirsutis et stellato-puberulis 7–11 cm. longis 1-floris; involucello 3-phyllo, bracteolis calyce demidio brevioribus; calycis lobis anguste ovatis acuminatis 1.5–2 cm. longis extus viridibus infra mediam partem hispidis intus minutissime canescenti-puberulis; petalis 2–2.5 cm. longis purpureis obovatis truncatis eroso-denticulatis; carpellis 4.5 mm. longis rugoso-reticulatis, rostro brevissimo incurvato.— Woods of the Ozark region of southwestern Missouri. Type collected at Eagle Rock, 7 Aug. 1905, *B. F. Bush*, no. 3145 (in Gray Herb.).

Related to *C. Papaver* (Cav.) Gray, which has the less copious pubescence of the stem, etc., ascending and usually appressed; the cauline leaves with narrowly lanceolate or linear divisions; and the bractlets of the involucel linear or narrowly lanceolate.]

Page 570, line 46; add as synonym: STUARTIA L'Hér.

Page 571, line 25; over the **A** of **ASCYRUM** insert an acute accent.

Page 573, line 42; *for* Mich. *read* Wisc. (*Wadmond*)

Page 578, line 59; *for* N. H. *read* Me. (*Miss Furbish*)

Page 579, line 5; *for* Nantucket *read* Norfolk Co., Mass. (*Wiegand*)

Page 589, line 1; over the **U** of **OPUNTIA** insert an acute accent.

Page 593, line 5; *add*: Var. GRACÍLIOR Turcz. Glabrous or essentially so; leaves rounded or cordate at the base; spike slender and loosely or often remotely flowered. — Locally established, Me. (*Miss I. W. Anderson*) and Mass. (*Rich*). (Introd. from Asia.)

Page 594, line 46; add as synonym: LUDWIGIA L.

Page 596, line 1; *for* L. *read* [Dill.] L.

line 18; *after* entire *insert*: or merely notched

line 20; *omit*: ; leaves entire or subentire, with revolute margins

after line 20 insert:

Seeds obovate, truncate or rounded at summit; coma quickly deciduous; leaves plane, somewhat toothed. 2a. *E. paniculatum.*

Seeds fusiform, distinctly beaked; coma somewhat persistent; leaves entire or subentire, with revolute margins.

After line 49, insert:

2a. **E. paniculàtum** Nutt. *Annual*, 3–8 dm. high, glabrous or glabrate; the *cortex exfoliating at base*; *leaves opposite or alternate* and bearing tiny axillary fascicles, lanceolate, sparingly denticulate, mostly petioled; flowers scattered, on often *bracted peduncles*; petals purple, about 8 mm. long; *seed obovate*, papillate, with early deciduous sordid coma. — Clearings and open places, Bruce Peninsula, Ont. (*Macoun*) to B. C., s. to S. Dak., Col., Ariz., and s. Cal.

Page 598, line 36; *omit* w.

Page 604, line 14; *for* n. Me., L. Memphremagog, Que. *read* n. and w. N. E.

Page 606, line 4; *after* southw. *insert*: ; occasionally spreading from cultivation northw.

Page 612, for lines 19–30, read:

Stylopodia erect or slightly divergent, distinct to the base
- Pedicels rather slender, not clavate; stems glabrous or sparingly pilose . . . . 1. *C. procumbens.*
- Pedicels short, clavate; stems rather densely pilose especially toward the base . . . . 2. *C. Tainturieri.*

Stylopodia connivent or at least somewhat convergent 3. *C. texanum.*

1. **C. procúmbens** (L.) Crantz. Slender, loosely branched often from the base, 1.5–5.5 dm. high; leaves glabrous or nearly so; the lobes of the leaflets oblong, bluntish or rounded at the apex; umbels long-peduncled or sessile, few-rayed; umbellets 2–6-fruited; *pedicels* 2–11 mm. long, *of nearly uniform thickness.*— Rich low woods and damp shady places, N. Y. to Mich., Ia., e. Kan., Miss., and N. C.

2. **C. Tainturièri** Hook. Erect or spreading, 2–7 dm. high; leaves distinctly pilose; the *lobes of the leaflets lanceolate to oblanceolate,* acutish; umbels sessile or rarely peduncled; umbellets 4–10-fruited; *pedicels* 1–9 mm. long, *thickish and clavate.*— Open woods and fields, Va. (*Churchill*) to Mo. (acc. to Bush) and southw. to the Gulf.

3. **C. texànum** Coult. & Rose. Erect, subsimple or often loosely branched, 2–6 dm. high, shortly and rather densely pubescent at least toward the base; leaves glabrous or sparingly pilose; the *lobes of the leaflets linear*; umbels sessile; umbellets 3–15-fruited; *pedicels clavate,* 0.5–8 mm. long; fruit glabrous.— Prairies and limestone barrens, w. Mo. (*Blankinship, Bush*), Kan., and Tex.

Page 612, line 36; add as synonym: Osmorrhiza Reichenb.

Page 614, line 35; *for* L. *read* [Rupp.] L.

Page 615, line 18; *after* Aug. *add*: (Eu.)

Page 616, line 35; for **P.** Saxífragra read **P.** Saxífraga

Page 617, line 17; over the **A** of **SCANDIX** insert an acute accent.

Page 623, line 13; *for* O. *read* Mo. (*Bush*).

line 28; *for* cuspidate; rays numerous *read* cuspidate, primary umbels 6–10 cm. broad, rays numerous; *leaves of the involucre simply pinnate,* with long linear attenuate segments

after line 31, insert:

2. **D. pusíllus** Michx. Similar; merely hispidulous; leaves more finely divided; the primary umbels 2–6 cm. broad, their rays short; *leaves of the involucre bipinnatifid.*— Barrens, etc., S. C. to Fla., Tex., Mo. (*Bush*), and westw. across the continent.

Page 624, line 48; *for* Minn. and Man. *read* Man. and Mo. (*Bush*).

Page 625, line 33; *for* Mich. *read* Wisc. (*Wadmond*)

Page 626, line 28; over the first **E** of **RHODODENDREAE** insert an acute accent.

Page 627, line 31; over the **E** of **CLETHRA** insert a grave accent.

Page 630, line 37; *for* L. *read* [Rupp.] L.

Page 632, line 19; *after* regions *insert*: ; Dells of the Wisconsin (according to Cheney & True)

Page 638, line 26; *for* C. Koch *read* K. Koch

Page 640, between lines 2 and 3, insert:

Var. **myrtilloìdes** (Michx.) Fernald. Leaves and young twigs pilose; leaves with bristle-tipped teeth.— Nfd. and Lab. to Hudson Bay, s. to N. S., Me., and Mass.

Page 641, line 45; *for* Var. INTERMÈDIUM Gray *read* Var. OVALIFÒLIUM Michx.

line 48; before — insert: (Var. *intermedium* Gray.)

[Recent studies of the Michaux herbarium show that *Vaccinium Oxycoccos* L., var. *ovalifolium* Michx. Fl. Bor. Am. i. 228 (1803) is identical with Var. *intermedium* Gray, Syn. Fl. ed. 2, ii. pt. 1, 396 (1886).]

Page 642, line 37; over the first **A** of **GALAX** insert a grave accent.

Page 643, line 6; over the **O** of **LIMONIUM** insert a grave accent.

Page 646, line 45; *for* L. *read* [Rupp.] L.

Page 648, line 1; over the second **A** of **SAPOTACEAE** insert a grave accent.

Page 654, line 38; over the second **A** of **SABATIA** insert a grave accent.

Page 657, line 1; in **procera** for the acute accent over the **o** substitute a grave accent over the **e**.

line 17; *before* n. N. B. *insert*: Nfd.

Page 661, line 47; *after* in *insert*: e. Mass. (*Rich*) and

Page 667, lines 44 and 45; *for* e. Mass. and Vt. *read* Me. (*Miss Furbish*)

Page 670, line 4; over the **E** of **IPOMOEA** insert a grave accent.

Page 671, line 36; in **CUSCUTA** for the acute accent over the first **U** substitute a grave accent over the second **U**.

line 43; *omit*: annual

Page 678, line 1; over the **E** of **PHACELIA** insert a grave accent.

line 18; *for* O. to Mo. *read* Va. to O., Ill.

between lines 18 and 19, insert:

Var. **brevistỳlis** (Buckley) Gray. Corolla smaller; style and stamens included. (*P. brevistylis* Buckley.) — N. C. to Ala. and Mo.

Page 680, line 14; over the second **O** of **HELIOTROPIUM** insert a grave accent.

Page 681, line 8; *after* Biennial *insert*: or perennial

Page 683, line 1; over the first **Y** of **SYMPHYTUM** insert an acute accent.

Page 690, line 14; over the second **A** of **CALLICARPA** insert an acute accent.

Page 693, line 33; for BÒTRYS read BÒTRYS

Page 694, line 19; *for* L. *read* [Rivinius] L.

Page 697, line 20; *for* L. *read* [Rivinius] L .

Page 698, line 27; over the **E** of **PHYSOSTEGIA** insert a grave accent.
line 49; at the beginning of the line insert: 2.

Page 699, line 50; *for* Wallr. *read* (Hoffm.) Wallr.

Page 700, line 1; *for* L. *read* [Tourn.] L.
after line 10, insert:

+- *Upper leaves sessile and clasping.*

line 13; *after* Oct. *insert*: — A cleistogamous form with minute tubular not obviously bilabiate corolla occurs.

after line 14, insert:

+- +- *Leaves all petiolate.*

lines 15 and 16; *for* crenate-toothed, *all petioled* read: *crenate-toothed*, the uppermost crowded, cordate, dark green and usually purplish-tinged; calyx commonly with purple angles

between lines 16 and 17, insert:

2a. **L.** HÝBRIDUM Vill. Similar, somewhat stouter; *leaves* pale green, *deeply and incisely toothed*, the uppermost less crowded, often subrhombic; calyx usually green throughout.— Waste and cultivated ground, N. E. to Pa., becoming frequent. (Adv. from Eu.)

Page 701, line 52; *for* Pa. *read* Mass. (*Wiegand*)

Page 705, line 26; *for* Vt. *read* N. E.

Page 706, line 12; *for* Mass. *read* Me. (*Miss Furbish*)

Page 708, line 31; *for* and Ky. to Fla. and Tex. *read* to Mo., Tex., and Fla.

Page 709, line 28; *for* N. H. *read* Me.

Page 710, line 30; *for* Ct. *read* Mass. (*Mrs. N. F. Flynn*)
line 52; *for* Ct. *read* Mass. (*Mrs. N. F. Flynn*)

Page 711, line 52; *for* toothed *read* blunt-dentate
line 53; *add*: Var. CRÍSPA Benth. Leaves laciniate-dentate. (Var. *nankinensis* Britton.) — Waste places,

roadsides, etc., Mass. to Ill., and southw. (Introd. from Asia.)

Page 712, line 22; for Lycopérsicon read Lycopérsicum.

[*Lycopersicum* Hill. Veg. Syst. ix. 32 (1765). *Lycopersicon* Mill. Dict. ed. 8 (1768). Hill's use of this generic name appears to be the earliest in post-Linnaean times and should therefore determine the form to be adopted.]

Page 713, line 48; *after* southwestw. *add*: ; adventive in Mass.

Page 715, line 3; *after* southw. *add*: ; adventive in N. E.

Page 716, line 24; for **N.** Physalòdes read **N.** physalòdes

[The specific name *physalodes* was originally used by Linnaeus (*Atropa physalodes*) Sp. Pl. i. 181 (1753) before its use as a generic name by Boehmer in Ludwig, Def. 41 (1760). There is therefore no occasion to capitalize the name on account of Recommendation X. of the Vienna Rules.]

Page 719, line 37; over the first **A** of **LINARIA** insert a grave accent.

Page 720, lines 16 and 19; before *Elatinoides* insert: *Kickxia* Dumort.;

Page 725, line 33; *after* summer *insert*: , sometimes late in the season minute and cleistogamous

line 49; *for* e. Mass. *read* s. N. H. (*Batchelder*)

line 51; *for* L. *read* [Rupp.] L.

Page 726, line 23; *before* Me. *insert*: N. S. (*Eames & Godfrey*),

Page 729, line 44; after pectinàta Nutt. insert: (*Dasystoma pectinata* Benth.)

line 45; *after* calyx. *add*: — N. C. to Fla., w. to s. Mo. and Tex.

Page 732, line 20; add as synonym: Castilleia Spreng.

Page 733, line 50; *after* coast *add*: , rarely inland,

Page 742, line 22, *after* concave *insert*: or plane

for line 23, substitute:

1. **Dianthera.** Bractlets narrowly lanceolate to linear, inconspicuous.
2. **Dicliptera.** Bractlets spatulate to obovate or suborbicular, conspicuous.

line 25; for 2 read 3

line 26; for 3 read 4

after line 39, insert:

2. **DICLÍPTERA** Juss.

Calyx deeply 5-parted. Corolla deeply bilabiate;

upper lip entire or emarginate, the lower spreading, slightly if at all 3-lobed. Stamens 2.— Branched perennial herbs, chiefly of low moist ground. Bractlets 2 or 4, opposite in pairs and forming a sort of involucel, the outer subequal, commonly appressed to each other and more or less inclosing the fruit. (Name from δικλίς, *double-folding*, as of doors, etc., and πτερόν, *a wing*, alluding to the involucel.) Diapedium Konig.

1. **D. brachiàta** (Pursh) Spreng. Erect or somewhat decumbent, 3–7 dm. high, smoothish or covered with spreading pubescence; leaves ovate, entire, acute, petioled, acutish or obliquely acuminate at the base; corolla 13–18 mm. long, pink or pale purple; bractlets spatulate-obovate, narrowed at the base. (*Diapedium* Ktze.)— Rich woods, sandy bottoms, etc., Mo. (*Bush*) to N. C., Fla., Tex., and Kan.

line 40; for **2** read **3**

Page 743, line 18; for **3** read **4**

Page 746, line 4; *add*: Dwarf plants with bracts slightly or not at all exceeding the flowers are sometimes separated as Var. Nuttállii (Rapin) Morris.

Page 747, line 20; *for* **A.** galioìdes Benth, *read* **A.** glaúca (L.) Bess.

line 22; *after* panicle *insert*: (*A. galioides* Bieb.)

[*Asperula glauca* (L.) Bess. Enum. Pl. Volh. 7 (1821–22). *Galium glaucum* L. Sp. Pl. i. 107 (1753). *A. galioides* Bieb. Fl. Taur.-Cauc. i. 101 (1808).]

Page 749, line 4; *before* Cape *insert*: Nfd. (*Eames & Godfrey*),

Page 756, line 3; *after* Fla. *add*: and Mo. (*Bush*).

Page 760, line 23; *for* dm. *read* cm.

Page 767, line 19; *for* C. Koch *read* K. Koch

Page 768, line 20; *for* Newport *read* Jamestown

Page 773, line 52; for **HELEÌNEAE** read **HELENÌEAE**

Page 782, line 47; *after* bogs, *insert*: Kingston, Mass. (*Rich & Knowlton*);

Page 793, line 24; *for* e. Mass. *read* s. Me.

Page 796, line 18; in **procera** for the acute accent over the **o** substitute a grave accent over the **e**.

Page 799, line 38; *after* southw. *insert*: ; established in Mass.

Page 800, line 26; *for* squrroase *read* squarrose

Page 801, line 36; at end of line add: 8. *A. spectabilis.*

omit lines 37–40.

line 69; for 34. *A. depauperatus* read 34. *A. parviceps*

Page 802, for lines 49 and 50, substitute:

Bracts without firm subulate tips.
Rays less than 1 cm. long . . (38) *A. dumosus*, v. *Dodgei*.
Rays 1.5–2 cm. long . . . . 55. *A. nemoralis*.

Page 803, line 22; for (34) *A. depauperatus*, v. *parviceps* read 34. *A. parviceps*

line 43; *before* Kan. *insert*: Mo. (*Bush*) and

Page 805, line 31; *after* stems *insert*: (1.2–)

line 33; *for* oblong-lanceolate *read* from elliptic-ovate to oblanceolate

lines 43 and 44; *for* Moist ground, coast of N. J. and southw. *read* Open ground, chiefly among the mts., s. e. Ky. to N. C. and Ga.

[*Aster surculosus* Michx., originally collected "in sylvis Carolinae septentrionalis," is a clearly marked species, with glandless though often pubescent blunt involucral bracts, very typical of the mountain region of western North Carolina and the adjacent states. It has long been reported as growing in the New Jersey pine barrens, although Dr. Britton, in the Illustrated Flora, implies a doubt as to its presence in New Jersey. There are apparently two sources for the New Jersey report: first, Dr. Gray's record, in the Synoptical Flora, of the species from "coast of New Jersey to Georgia, and on the Blue Ridge in North and South Carolina"; second, the record by Dr. Britton, in his Catalogue of Plants found in New Jersey, of the species from Middlesex Co., N. J. Dr. Britton's later doubt of the occurrence of the plant in New Jersey, implied in the Illustrated Flora, disposes of the second record. It remains then to determine only the basis of Dr. Gray's record. This is a very slender narrow-leaved plant, collected by Dr. Gray in 1833 at Middletown Point. In its narrow leaves and slender habit it strongly suggests the Carolinian *A. surculosus* but unlike that plant it has the more pointed involucral bracts densely glandular as in *A. spectabilis* Ait. The plant, however, is much smaller in all its parts than well developed *A. spectabilis* and upon casual examination would be scarcely referred to it;

but Mr. F. S. Collins has recently collected in the extremely sterile soil of Eastham on Cape Cod a dwarfed plant, quite identical with the Middletown material, which is unquestionably a depauperate state of the common *A. spectabilis.* There is, then, no question that the small plant of the New Jersey coast is a starved phase of *A. spectabilis* rather than the Carolinian *A. surculosus* to which it has been referred.]

Page 810, line 28; *before* T. & G. *insert*: (Michx.)

for lines 37 to 50, substitute:

34. **A. párviceps** (Burgess) Mackenzie & Bush. Stem pilose to glabrate, 3–7 dm. high; basal leaves spatulate; stem-leaves linear or lanceolate, those of the branches linear-subulate; *heads* numerous, *small,* 4–5 *mm. high,* borne on the short branches; *involucre turbinate,* 2–3 *mm. broad,* of about 20 linear-subulate bracts, these less rigid than those of the preceding species; rays white, 10–20. (*A. ericoides,* var. Burgess.)— Prairies and woods, Ill, and Mo. Sept., Oct.

Var. **pusíllus** (Gray) Fernald. Slender, glabrous, 1–4 dm. high; leaves much smaller, linear to linear-subulate; heads scattered, terminating the slender divaricate branches. (*A. ericoides,* var. Gray; *A. ericoides,* var. *depauperatus* Porter.)— Serpentine barrens, s. Pa. and adjacent W. Va. July–Sept. FIG. 950.

under Fig. 950; *for* A. depauperatus *read* A. depaup., v. pusillus

[When the combination *A. depauperatus* was made for the plant of serpentine barrens the fact was overlooked that Mackenzie & Bush had already published *A. parviceps.* The nomenclatorial history of the plants is as follows:

Aster parviceps (Burgess) Mackenzie & Bush, Fl. Jackson Co. 196 (1902). *A. ericoides parviceps* Burgess in Britton & Brown, Ill. Fl. iii. 379 (1898). *A. depauperatus,* var. *parviceps* Fernald, RHODORA, x. 94 (1908).

Aster parviceps, var. **pusillus** (Gray) Fernald, comb. nov. *A. ericoides,* var. *pusillus* Gray, Syn. Fl. i. pt. 2, 184 (1884). *A. ericoides depauperatus* Porter, Mem. Torr. Bot. Club, v. 323 (1894). *A. depauperatus* Fernald, RHODORA, x. 94 (1908).]

Page 811, line 32; *after* ascending *insert*: , glabrous or nearly so
line 33; *add:* Var. Dódgei Fernald. Similar; stem and lower surface of the leaves densely cinereous-puberulent. — Mouth of the St. Clair R., Mich.

Page 815, line 36; *for* southw. *read* southw. and southwestw.

Page 823, line 51; *after* places, *insert*: Nfd. (*Eames & Godfrey*) and

Page 828, line 17; *for* rootstocks *read* roots
line 20; *after* southwestw. *add*: ; rarely adventive eastw.

Page 833, line 6; *before* Minn. *insert*: Prairies, n. w. Wisc. (according to Cheney) and
line 7; *after* established *insert*: at Peoria, Ill. (*McDonald*) and

Page 841, lines 9–11; FOR *leaves bright green*, undivided or some of the lower deeply parted, lanceolate or elliptic, large, acuminate, *slender-petioled*, coarsely serrate; READ *leaves* coarsely serrate, at least the *primary cauline 3-lobed the two lateral* oblong *lobes* broad-based and conspicuously *decurrent to the broadly margined petiole*; uppermost and rameal leaves usually unlobed, subsessile or shortly petioled;
line 16; *for* N. E. to Minn. and Mo. *read* Que. to Mich. and Mass., and doubtless southw.
between lines 17 and 18, insert:

Var. **petiolàta** (Nutt.) Farwell. All or nearly all the leaves unlobed, tapering to a slender or narrowly margined petiole.— Me. to Minn. and Kan.

Page 842, line 33; add as synonym: Baldwinia T. & G.

Page 845, line 17; add as synonym: Dysodia DC.

Page 848, line 3; *for* L. *read* [Tourn.] L.
line 33; *for* L. *read* [Tourn.] L.

Page 849, line 19; for PRÓCERA read PROCÈRA

Page 853, line 44; *before* e. Que. *insert*: Nfd. (*Eames & Godfrey*) and

Page 854, line 43; *before* Gaspé Co. *insert*: Nfd. (*Eames & Godfrey*) and

Page 856, line 4; for **A.** mìnus Bernh. read **A.** mìnus (Hill) Bernh.

Page 859, line 8; after (*G. W. Holt*) insert: ; waste land, Boston, Mass. (*Rich*)
line 19; add as synonym: Onopordon Hill.

Page 861, line 10; *before* N. S. *insert:* Nfd. (*Eames & Godfrey*) and

Page 862, line 17; for **A.** MÍNIMA (L.) Dumort. read **A.** MÍNIMA (L.) Link.

[*Arnoseris minima* (L.) Link, Enum. ii. 294. (1822); Dumort. Fl. Belg. 63 (1827). *Hyoseris minima* L. Sp. Pl. ii. 809 (1753).]

Page 863, line 13; *for* L. *read* [Vaill.] L.

Page 867, line 3; *for* e. Mass. to Ind. *read* N. E. to Neb. (*Bates*).

Page 871, line 48; *for* N. S. *read* e. Me.

Page 872, line 36; *after* Ont. *insert*: , Wisc.,

Page 873, line 55; *for* Mass. *read* w. Me. (*Miss Furbish*)

Page 888, column 2; beneath *hirsuticaulis* 812 insert: *ianthinus* 805

" multiflorus 811 insert: *multiformis* 805

" nemoralis 816 insert: *nobilis* 805

column 3; *beneath* tennesseensis 515 insert: *violaris* 805

Page 924, column 1, line 38; *for* Oxycoccus *read* Oxycoccos

GRAY HERBARIUM.

ON THE NATURE OF SO CALLED ALGAL OR BOGHEAD COALS.

EDWARD C. JEFFREY.

As the result of the studies of the French and Belgian paleobotanists Renault and Bertrand, on the dull bituminous coals and schists, certain organisms have been described, which have been considered by these authors to be the remains of oil-containing colonial gelatinous green Algae. It is assumed that the supposed Algae owe their preservation, in spite of their delicate organization, to the presence of bitumen throughout the matrix in which they have become fossilized. The origin of this bituminous matter has always been a puzzling problem. It has been variously suggested that it is derived from the putrefaction of animals, through the decay of part of the algal matter, or even as a product of the precipitation of the dark brown humus-saturated bog water, in which the Algae are supposed to have existed.

The study of coal presents a scientific problem of peculiar technical difficulty. On account of its black opacity, its structure can only be

made out in very thin sections, which allow a certain amount of light to be transmitted to the microscope. The preparation of such sections of sufficient thinness is an almost impossible task in many instances, on account of the brittleness of the coal, which greatly enhances the difficulty of the grinding processes, employed in the study of the microscopic structure of minerals. The writer in his studies on Mesozoic plants has acquired some experience in softening fossilized vegetable tissues, without essentially modifying their structure. An application of these methods to coal was without result, on account of the greater resistance of the material. It was found that neither *aqua regia* nor chlorate of potash yielded appreciable results in the desired direction. An *aqua regia* in which hydrochloric acid was replaced by hydrofluoric acid was finally tried with complete success. Even anthracite yields to its action in the course of a comparatively short time. Subsequently to exposure to nitrohydrofluoric acid for a sufficient interval, the coals, after careful washing, are soaked in hot alcohol containing from three to five *per cent.* of fixed alkali. The latter process effects the swelling of the constituents of the coal without disastrous cracking and softens them so that they may be sectioned by the delicate methods in vogue in biological laboratories. As a preliminary to cutting, the fragments of coal are infiltrated with nitro-cellulose to bring them to a more favorable consistency. The advantage of this method is, not only that it is possible to cut very much thinner sections than can be obtained by the grinding lathe of the mineralogist (3-5 *micra*), but that these sections may subsequently be bleached with nitric acid and strong chlorine water to almost any desired degree of decoloration.

The present notice is mainly to indicate the botanical composition of certain true bituminous coals, known as Bogheads, as examined by the methods indicated above. It has been demonstrated, that the supposed Algae of Renault and Bertrand, are in reality the larger spores or macrospores of Vascular Cryptogams, which flourished during the Coal Periods. The imagined Algae are in fact only the pores in the strongly sculptured coats of the spores in question. The apparent organization of the Algae as colonies forming a hollow sphere, is explained as the highly sculptured wall of the macrospore surrounding its empty cavity. The macrosporic nature of these remains is apparently placed beyond any doubt by the occurrence of the typical triradiate ridge on the face originally in contact with the three sister macrospores of the macrospore tetrad and by the very characteristic

macrosporic sculpture of the spore wall as seen in the thin sections prepared by the methods described above. Moreover their algal nature appears quite excluded by the fact that highly modified remains of wood have been found intermingled with the supposed Algae. It is not conceivable that delicate algal structures should have been preserved by the hypothetical bituminous matrix, while the much more resistant fragments of wood, should have suffered carbonification. The supposed Algae so far studied in this connection belong to the genera Thylax, Pila and Reinschia.

It seems highly probable as the result of these observations, that the bituminous matter found in Boghead and similar coals, as well as in oil-shales, etc., is rather a product of the modification of the natural waxy or cutinoid infiltration of the outer coats of innumerable spores (microspores as well as macrospores), than the product of animal or algal decay. The results here indicated seem further to overthrow the sapropelic or gelosic hypothesis of the formation of certain coals, and of petroleum proposed in Europe and to a certain extent adopted in this country.

Phanerogamic Laboratories of Harvard University,
9th March, 1909.

OCCURRENCE OF THE SKUNK CABBAGE IN AN UNUSUAL PLACE.

William Brewster.

The Skunk Cabbage is rarely met with, I believe, in other than low-lying and more or less swampy localities. At Concord, Massachusetts, however, there is a solitary plant of this species which has not only existed, but positively flourished, for a number of years, in a somewhat elevated and exceptionally dry situation on Ball's Hill. This long, narrow, gently curving ridge is of glacial origin and composed almost wholly of fine yellowish sand and coarse reddish gravel. It is everywhere densely wooded, chiefly with second-growth oaks intermingled with white and pitch pines. Beneath these trees the surface soil, although somewhat enriched with leaf mould, is so gen-

erally thin and sterile that it supports but little herbaceous vegetation especially on the south side of the hill which is very steep and not perfectly screened by the trees from the scorching rays of the midsummer sun. Yet it is on this very southern slope and about midway between the base and summit of the hill (which has an elevation of some seventy feet) that the Skunk Cabbage grows, not, however, in the ground but in a crevice at the foot of a white oak of medium size. Here it has found conditions evidently congenial and perhaps in some respects not unlike those which obtain in swamps; for the cavity is, in effect, a deep, narrow-mouthed, wooden bowl which receives and retains the rain water that falls directly into it and, in addition, very much of that which drives against the trunk of the tree and trickles downward towards its base. Owing to this abundant supply of moisture the soil which fills the bowl and which is made up partly of decayed wood and partly of the remains of disintegrated leaves, is almost always moist and frequently of the consistency of semi-liquid mud.

When I first noticed the Skunk Cabbage in midsummer, some twelve or fifteen years ago, it must have been very young for its light green leaves were then no longer than those of our common red clover. It has since increased in stature steadily, if somewhat slowly, until it has become a well-grown and vigorous-looking plant. As nearly as I have been able to ascertain, however, it has not bloomed as yet. Perhaps it will not live to do so, for gypsy and brown-tailed moths are attacking the trees that shelter it and the entire hillside is likely to be stripped of foliage in the course of the next two or three years.

Cambridge, Massachusetts.

Cryptogramma Stelleri in New Hampshire.—It may be of interest to the readers of Rhodora to have put on record the finding of *Cryptogramma Stelleri* (Gmel.) Prantl in northern New Hampshire. On 16 July, 1907, Mr. A. H. Moore and I discovered a good-sized station of this fern on shaded dryish cliffs in the town of Colebrook. I should be interested to know whether it has been previously found in New Hampshire.—Arthur Stanley Pease, Cambridge, Massachusetts.

Vol. 12, no. 122, including pages 17 to 32 and plate 78, was issued 16 March, 1909.

Gray's New Manual of Botany—7th Edition

An illustrated flora of the Northern United States and Canada east of the 96th meridian. By ASA GRAY, LL.D., late Professor of Natural History, Harvard University. Thoroughly revised and largely rewritten by BENJAMIN LINCOLN ROBINSON, Ph.D., Asa Gray Professor of Systematic Botany, and MERRITT LYNDON FERNALD, S.B., Assistant Professor of Botany, Harvard University, assisted by specialists in certain groups. With more than nine hundred text figures.

Regular Edition. Cloth, illustrated, 8vo, 928 pages. Price, $2.50.

Tourist's Edition. Limp leather, 5×7½ inches. Price, $3.00.

AMERICAN botanists, who have been impatiently awaiting the revision of this indispensable work, will be delighted to know that a seventh, completely revised, and copiously illustrated edition, is now ready. The revision has entailed years of work by skilled specialists. No effort or expense has been spared to attain the highest degree of clearness, terseness, and accuracy. The plant families have been rearranged in a manner to show the latest view of their affinities, and hundreds of species have been added to the flora. The nomenclature has been brought into thorough accord with the important international rules recently established — a feature of great significance. Indeed, the Manual is the only work of its scope which in the matter of nomenclature is free from provincialism and rests upon a cosmopolitan basis of international agreement. Nearly a thousand figures have been added, and scores of brief and lucid keys have been introduced in a manner which greatly simplifies the problem of plant identification. The work has been extended to include Ontario, Quebec, and the maritime provinces of Canada.

AMERICAN BOOK COMPANY

New York Cincinnati Chicago Boston

HOME GROWN LILIES.

Fresh from Beds. Wild Flowers, Hardy plants of all kinds.
Send for catalogue.

F. H. HORSFORD, Charlotte, Vt.

WASHINGTON'S FLORA.

A few complete sets and some incomplete ones of my Fascicle XII of Washington Plants are still on hand; also specimens of many species distributed in earlier fascicles. Send for lists.

W. N. SUKSDORF - - Bingen, Wash., U. S. A.

CAMBRIDGE BOTANICAL SUPPLY COMPANY,
WAVERLEY, MASS.

BOTANICAL SUPPLIES OF EVERY DESCRIPTION.

Samples of Driers and Mounting Papers sent on request.
ASK FOR NEW CATALOG, NO. 91.

STANDARD MATERIAL. IMMEDIATE SHIPMENT.

Physiological Instruments. How do Plants Work?

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3-4 in. 1 year $4.00, 6 months $2.50.

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB.

Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS
MERRITT LYNDON FERNALD } Associate Editors.
HOLLIS WEBSTER

WILLIAM PENN RICH
EDWARD LOTHROP RAND } Publication Committee.

Vol. 11. April, 1909. No. 124.

CONTENTS:

Two New Species of Characium. *F. D. Lambert* 65

Bartonia, a new Botanical Periodical 74

Flora of the Boston District, — IV 75

Nolina in the southern Atlantic States. *H. H. Bartlett* . . 80

Rare Plants from the Vicinity of Wellesley. *K. M. Wiegand* 82

On the Report of Scirpus nanus from Vermont. *M. L. Fernald* 84

Boston, Mass. 1052 Exchange Building.

Providence, R. I. Preston and Rounds Co.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price $1.00 per year ($1.25 to all foreign countries including Canada); single copies 15 cents. Volume 1, $2.00, Vol. 2, $1.50. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

B. L. ROBINSON, 3 Clement Circle, Cambridge, Mass.

Subscriptions, advertisements, and business communications to

W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

Single copies may be had from

E. L. RAND, Corresponding Sec'y N. E. Botanical Club,

1052 Exchange Building, Boston, Mass.

Entered at Boston, Mass., Post office as Second Class Mail Matter

---

SYNOPTICAL FLORA OF NORTH AMERICA, by A. GRAY and others. Vol. I. Fascicles 1 and 2. A critical treatment of forty-five families of polypetalæ (*Ranunculaceæ to Polygalaceæ*) 1895-1897. $5.20.—GRAY HERBARIUM of Harvard University, Cambridge, Mass.

NEW ENGLAND WILD FLOWERS AND THEIR SEASONS, by WILLIAM WHITMAN BAILEY. Price 75 cents net.—PRESTON & ROUNDS Co., Providence, R. I.

WASHINGTON'S FLORA.

A few complete sets and some incomplete ones of my Fascicle XII of Washington Plants are still on hand; also specimens of many species distributed in earlier fascicles. Send for lists.

W. N. SUKSDORF - - Bingen, Wash., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collectors' memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3-4 in. *1 year $4.00, 6 months $2.50.*

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 11. April, 1909. No. 124

TWO NEW SPECIES OF CHARACIUM.[1]

F. D. Lambert.

(Plate 79.)

Characium gracilipes n. sp. Cellula 80–480 μ longa, 5–13 μ diam., regulariter curvata, parte media fusiformis, superne in setam longam, inferne in stipitem longam filiformem attenuata, rhizoideis minutissimis substrato affixa.

Cells 80–480 μ long, 5–13 μ diameter, regularly curved; middle part fusiform, tapering above into a long hair, below into a long filiform stipe, attached to the substratum by very minute rhizoids.— On the minute crustacean, *Branchipus vernalis*, Medford, Massachusetts, May, 1903, 1904, 1905, and 1906.

In May, 1903, while I was collecting with a class in biology, in Medford, Mass., on the edge of the Middlesex Fells, one of my students called attention to a small green object moving about in a small pool. On examination it proved to be a fairy shrimp, *Branchipus vernalis*, one of the animal forms for which I was searching, and as its color was so very unusual, a number of the animals were collected and carried to the laboratory. A microscopic examination showed that the green color was due to masses of green algae attached to various parts of the body, particularly to the appendages. As it seemed likely that the plant might be of interest and perhaps also might be desirable for distribution in the Phycotheca Boreali-Americana, some of the Branchipus were submitted to Mr. F. S. Collins for identification of the algae, who immediately reported that they were apparently two new species of Characium. Only a few of the

[1] Contributions from the Biological Laboratories of Tufts College, No. 48.

Branchipus were collected that spring; in the spring of 1904 a few more were collected from the same pond; but not until the spring of 1905, however, were conditions favorable for collecting the material in sufficient quantity for the P. B.–A. sets. At that time there was but little water in the pool, and it lowered so rapidly during the time Branchipus was present, that the animal was driven gradually toward deeper water. I was able to scoop up with a net from the muddy hole in the middle of the pool, about a pint of specimens, which I preserved in 5 % formaldehyde. Other pools in the vicinity were frequently but unsuccessfully examined. Only the one pool contained it, and in such abundance that a recent examination of the material collected in 1905 showed the Characia attached not only to Branchipus, but also to mosquito larvae, which had been overlooked at the time of collection. In May, 1906, a few sketches, not more than eight or ten, were made from a small number of specimens collected at that time, but the scarcity of Branchipus made it advisable to postpone further investigations until the next spring, when, it was hoped, material would be sufficiently abundant for a study of the reproduction. Failure to find the material in 1907 and in 1908 leads me to fear that it may have disappeared entirely; hence the publication of the present account founded almost wholly on material which was collected in 1905 and preserved in formalin, and from which sets for the P. B.–A. were prepared.[1]

Characium gracilipes occurs in greatest abundance on the flat surfaces of the two sides of the abdominal appendages of Branchipus, and rarely on the marginal hairs for which *Characium cylindricum* seems to show a preference. Both species, however, may be found on the head, antennae, and mouth-parts, and dorsal surface of body and tail. In respect to size, both *Characium gracilipes* and *Characium cylindricum* differ greatly from all species heretofore described: the smallest specimen of *Characium gracilipes* which I measured, 80 μ, was almost as long as the extreme length given by West [2] for *Characium ensiforme* Herm, 86 μ, which, he states, "is the most elongate species of the genus." The longest specimen of *Characium gracilipes*

[1] In order to prepare the material for the P.B.–A., about 500 formalin specimens of Branchipus were spread out to dry on a clean sheet of glass. When dry, they were fastened on mica with glue, two or three specimens on a piece. *Characium gracilipes* P. B.–A., No. 1270; *Characium cylindricum* P. B.–A., No. 1269.

[2] West, G. S. The British Freshwater Algae, Cambridge, 1904, p. 200.

which I observed, measured 480 μ, nearly six times as long as the maximum length for *Characium ensiforme* Herm.

The stipe and terminal hair are in line with the general curve of the body (fig. 4, pl. 79). The one cell stage of *Characium gracilipes* reminds one of *Closterium rostratum* Ehrenb., as figured by West.[1] In later stages during spore formation a more pronounced curvature frequently accompanies the elongation of the body, but it seldom exceeds an angle of 90°, and is always simple and in one direction.

The terminal hair, open throughout its entire length, but closed at its distal end, is about the same length in all specimens, and always shows a sharp demarcation from the fusiform body, from the apex of which it emerges. The lower end of the fusiform body tapers gradually into the stipe, also like the terminal hair, of capillary dimensions and hollow. The stipe is closed at a point very near its base. The base of this plant is remarkable in that it adds a new character for Characium, viz., the presence of minute rhizoids. These are of different forms, but the most typical is that shown in figures 3, 4, 5, 6 and 9 (pl. 79), which show two smooth, straight, slender, solid processes emerging from the closed base of the stipe, with which and with each other, the rhizoids form three approximately equal angles of about 120° respectively. This divergence is almost always evident, inasmuch as the rhizoids are in the same plane as the line of curvature, and as the specimens can naturally take but one position in the narrow space between the slide and cover. These processes, usually of the same length, vary from 2 to 10 μ. Fig. 22 (pl. 79) illustrates the largest observed.

Pl. 79, fig. 14, shows two rhizoids of approximately equal length, emerging at the same angle on one side of the stipe; fig. 15, rhizoid of one side with a hook turning inward; fig. 17, two rhizoids with hooks turning outward; fig. 16, two rhizoids depending from base, like a two-tined pitch-fork, not an uncommon condition; fig. 20, two rhizoids of the normal shape, but of unequal length; fig. 19, three rhizoids, a very rare condition; figs. 18 and 21, rhizoids of normal type with a tendency toward a branching which may vary from merely slight roughenings and thickenings to well-defined short branches. This condition is more common than that of fig. 19, but occurs less frequently than others. For a long time I really doubted this form, thinking the

[1] West, G. S. A monograph of the British Desmidiaceae. Vol. I, Pl. XXVI, fig. 1.

branched appearance might be due to the presence of detritus not unusual about the bases of the rhizoids. As efforts to dislodge these branch-like processes from the rhizoids failed, I concluded that in some cases, at least, the branching was real. The rhizoids penetrate the mucus on the surface of the appendages, and are well adapted to retain a hold on the swimming Branchipus. At first glance the rhizoids, particularly the short ones, might easily give the impression that the base consists of a disc seen in optical section, but careful observation with ordinary high powers, as well as with oil-immersion lens proves the fallacy of this supposition. This suggests a possibility that some of the structures, hitherto described in other species as discs, may have been, in some instances, rhizoids which, on account of insufficient magnification, have escaped detection.

The single parietal chromatophore shows a single conspicuous pyrenoid on the convex side of the cell, a position which the pyrenoids continue to occupy in the later stages during the entire process of transverse segmentation of the protoplast. The pyrenoid appears as a highly refractile body, spherical or ovoid in outline, separated from the chlorophyll-bearing part of the chromatophore by a narrow hyaline zone; always visible, it can be followed very easily in all the phases of its division and movement during the process of spore production. See figs. 3, 4, 5, 6 and 9 (pl. 79). The division of the pyrenoid is accompanied by a simultaneous division of the chromatophore into two equal parts. The pyrenoid, in dividing, first elongates, then by a median constriction, assumes a dumb-bell shape, and finally divides into two parts, each of which assumes the original rounded form. The division of the pyrenoid is the first visible evidence of spore development.

The usual method of spore formation is by repeated transverse division of the protoplast, which gives 32 cells arranged in a single series. Next, by longitudinal division, each of the 30 cells in the middle of the plant divides into two cells; at the same time, the basal and the terminal cells divide transversely, thus giving 64 cells, the maximum observed. See figs. 6 and 9 (pl. 79), the latter representing the basal (z) and terminal (x) portions of a plant containing 64 spores. The general plane of longitudinal division throughout the mother cell is usually continuous. Although this is the usual method of division, occasionally the longitudinal division occurs in an earlier stage. Fig. 5 (pl. 79) shows the longitudinal division appearing in the 4 cell

stage. In other instances the longitudinal division first occurred in the 8 and in the 16 cell stage of the uniseriate type. The division of basal and terminal cells is always transverse, never longitudinal. At any stage, a count of cells and a careful examination of the pyrenoids leads to the conclusion that the divisions are approximately simultaneous throughout the length of the cell; the evidence, while not conclusive, suggests that a cell, once divided longitudinally does not divide again in any plane. Elongation of the individual is not always correlated with the progress of spore formation. Some individuals in incipient 2 or 4 cell stages are as long as others in fully developed 8 cell stages. Among the thousands of specimens that have been under observation, I have been unable to find any trace of the liberation of the spores, or of their germination; any empty cells; or any evidence of the spores assuming the rounded form characteristic of *Characium cylindricum* and of other species which have been hitherto described. A microscopic examination of Branchipus bearing the Characia always shows many specimens of *Characium gracilipes* broken, especially in the advanced stages of spore formation. These broken cells, however, present no evidence of the escape of the contents, save at the very ends, and there, only a few cells. There is no uniformity in the length of the broken pieces, nor in their stage of development. They may vary from early stages up to the 64 cell stage. Basal, middle, and distal portions all appear in the field at once, which leads one to think that the elongated *Characium gracilipes* had been broken up mechanically in the manipulation of the material under the coverglass. An examination of entire specimens of Branchipus, under conditions where the chances of mechanical disturbance were at a minimum, still showed broken specimens. Moreover, inasmuch as the formalin had not caused any appreciable swelling, this broken condition could not be ascribed to the effect of the preservative. If fragmentation be the normal method of spore liberation, it is difficult to understand what becomes of the empty cells, and why there is no satisfactory evidence of liberation of the spores. If this fragmentation of *Characium gracilipes* be characteristic for the species, it may be that the liberated cells, on dissolution of the containing wall, assume the palmelloid state which has been described for other species. I have not seen evidence of the palmelloid condition. It seems strange that none of the germinating spores could be found; the smallest specimen observed measured 80 μ in length, and was fully developed in every respect.

Characium cylindricum n. sp. Cellula 24–430 μ longa, 10–20 μ diam., cylindrica, apice rotundata, basi in stipitem brevem attenuata; disco basali nullo.

Cell 24–430 μ long, 10–20 μ diam., cylindrical, with rounded apex, base tapering into a short stipe, without basal disc. — On the minute, crustacean, *Branchipus vernalis*, Medford, Massachusetts, May, 1903, 1904, 1905 and 1906.

Characium cylindricum, in the one cell stage (figs. 10, 11, 12 and 13, pl. 79), has a central nucleus and two parietal chromatophores. The chromatophores almost completely line the circumference of the cell, are slightly but distinctly separated from each other, thus affording a good view of the nucleus, situated near the middle of the cell and are without pyrenoids. Numerous small oil globules are often present in the cell. The lower portion of the cell tapers into a very short stipe with base rounded or pointed and often slightly bent at the place of attachment to the substratum.

Characium cylindricum occurs in greatest numbers upon the marginal hairs (on both main shaft and small branches) of the appendages of *Branchipus vernalis*, but may occur anywhere on the appendages. Each individual is attached by means of a small, brownish, mucilaginous mass, distinct in outline, and usually very conspicuous on account of the detritus present upon its surface. See fig. 25 (pl. 79). The transparency of the chitinous wall of the hair affords an excellent opportunity to study the attachment from any point of view. In fig. 25 (pl. 79) the cell (a) is attached to the under side of the hair. The adhesive substance, when circular in outline, might easily be mistaken for a disc, did not its transparency permit a clear view of the pointed or rounded outline of the wall at the base of the cell. Whenever the cell is attached to two or more of the smaller hairs, they incline toward a common point of crossing, at which point the mucilaginous substance adheres. This method of attachment seems quite as well adapted to its function as do the rhizoids of *Characium gracilipes*. When *Characïum cylindricum* cells become detached from the hairs by mechanical disturbance of the cover glass, the adhesive substance usually sticks to the substratum, and the basal ends of the cells are clean, as illustrated in figs. 1, 2, 7, 8, 10, 11, 12, 13, and 24 (pl. 79). Observations under conditions of minimum mechanical disturbance show small patches of the adhesive substance here and there on the hairs, thus indicating that the cells of *Characium cylindricum* occasionally become detached from the live Branchipus.

By repeated transverse divisions the protoplast of the single cell divides into 8, 16, or 32 spores, fig. 24 (pl. 79). The regularity of approximately transverse divisions is frequently varied by a tendency toward the oblique, which may be confined to a few cells only, or may extend to the entire series. Longitudinal division usually begins after the protoplast has divided into 8 or 16 cells, though it may occur as early as the 4 cell stage. However, the above mentioned obliquity of the transverse divisions is usually so marked in the later stages (8–16 cell) that it is extremely difficult to determine whether division is transverse or longitudinal. In the individual illustrated in fig. 1 (pl. 79) there are eight spores, apparently motile, a condition still further confirmed not only by their arrangement and shape, but also by the presence of the hyaline papilla (p) at the anterior end, in connection with which I observed evidence of flagellae too indistinct to be studied. One of the spores (b) is seen escaping from a lateral aperture. There were but eight spores in the specimen shown in fig. 1 (pl. 79), but the unoccupied space in the containing cell would seem to indicate that the original number might have been 16, eight of which had been liberated. Fig. 7 (pl. 79) illustrates a cell containing 32 spores, which, from all appearances, were motile at the time of fixation. As the small amount of unoccupied space in the cell precludes 64 as the original number of the spores, it seems safe to assume that none of the spores had escaped. Apparently not more than eight or ten of the spores had been actively motile up to the time of fixation; moreover, with exception of the two detached spores near the base, the spores in the lower two thirds of the cell present the usual appearance of the protoplast after its division into 32 cells. The difficulty, previously mentioned, of interpreting the direction of planes of division is well illustrated in this specimen.

In another type of spore formation, by a process of segmentation, in its early stages indistinguishable from the foregoing, the protoplast divides into a very large number of small spores (fig. 8, pl. 79). In the more elongated specimens the number of these small spores certainly exceeds 1000, and in some cases perhaps 2000. Their number is not constant, however, as advancement in segmentation is not coordinated with the length of the specimen. Moreover, it is certain that these small spores, when fully developed and ready to escape from the cell, are not of uniform size. The few scattered spores near the base of the cell, the perforated apex of which appears in fig. 23 (pl. 79), measured

3 μ, certainly much larger than those which appear in fig. 8 (pl. 79). In the formalin material it was impossible to distinguish any details with respect to the flagellae of these spores, or to determine what becomes of any of the motile cells. Perhaps they are the micro- and macro-zoospores mentioned by Oltmanns,[1] as described by Reinhardt.[2]

Although *Characium cylindricum* is characterized by so many features, visible nucleus, two chromatophores, oil globules, absence of pyrenoids, peculiarity of attachment, and peculiarities of reproduction, at variance with what have been accepted up to this time as generic characters of Characium, it does not seem advisable to make a new genus for this form, without further study of living material.

Reinsch [3] has described a minute alga, *Dactylococcus Hookeri*, which he found growing attached to the small crustacean, *Cyclops bicaudatus*, collected in the neighborhood of Erlangen, Germany, in 1872. In 1874 he found another form, *Dactylococcus De Baryanus*,[3] growing on the same crustacean, *Cyclops bicaudatus*, collected in the same region. In the summer of 1877 he found the latter form, *Dactylococcus De Baryanus*, on "a somewhat smaller species" of *Cyclops* from pools a few miles west of the southern end of Lake Michigan. Again in the following summer, 1878, he discovered *Dactylococcus De Baryanus*, on *Cyclops bicaudatus* and on a species of *Lepidurus*,[4] taken from the water mains of the city of Boston. As Mr. F. S. Collins regards both of these species of Dactylococcus as belonging to the genus Characium, it is of interest to note what Reinsch [5] has described for the reproduction of *Dactylococcus De Baryanus*, the species which he found here in the vicinity of Boston. He describes as the earliest stage of development a slow-moving, green amoeboid cell of about 25 μ diameter, with red stigma. When these cells are elongated they have at the anterior hyaline end a single vibratile flagellum terminated by a bead-like thickening. After a short time these cells lose their power of movement, attach themselves to the surface of the

[1] Oltmanns, Dr. Fr., Morphologie und Biologie der Algen, Jena, 1904, Bd. 1, p. 175, quoting.

[2] Reinhardt, L., Entwickelungsgeschichte der Characien. Protok. d. Sekt.-Sitz., d. 5. Vers. Russ. Naturf. u. Arzte in Warschau, 1876. Jahresber. 4, p. 50.

[3] Reinsch, P. F., Contributiones ad Algologeam et Fungologeam, p. 78, pl. 11.

[4] In referring to the crustaceans found in the water mains of the city of Boston, Reinsch says, "Am 20 Juni waren die meisten untersuchten Thierchen (*Cyclops bicaudatus* und einer *Lepidurus*-species, von der deutschen verschieden) mit Parasiten besetzt." Inasmuch as Lepidurus is not known to occur east of the Great Plains, it is impossible to say what crustacean is referred to here.

[5] Reinsch, P. F., Beobachtungen über entophyte und entozoische Pflanzenparasiten, Botanische Zeitung, 1879, p. 38, pl. 1, figs. 21–24.

crustacean, and quickly develop into the adult Dactylococcus, the protoplast of which finally becomes divided into three or more daughter cells. The subsequent history of these daughter cells was not observed. Whether these features which have been described for *Dactylococcus De Baryanus* offer any solution for the gaps which at present I am unable to bridge in the life history of *Characium gracilipes* and *Characium cylindricum*, cannot be told until further observations can be made on living material of the two species of Characium and, if possible, on *Dactylococcus De Baryanus* itself.

Characium gracilipes and *Characium cylindricum* are hosts of a fungus, two stages of which are figured. Fig. 3 (pl. 79) shows an early stage; a late stage is represented in fig. 2 (pl. 79). The fungi occur attached to any part of either species, except the rhizoids and the distal region of the terminal hair in *Characium gracilipes*, and the region of attachment in *Characium cylindricum*. Presence of the fungus usually produces considerable modification in the shape of the Characium. In the earlier stages of the development of the fungus, the protoplast of the host shows a slight disturbance which increases as the development of the fungus advances. By the time the fungus has reached maturity, the protoplast of the host has usually quite disappeared, fig. 2 (pl. 79). This fungus will be the subject of a later paper.

Tufts College, Massachusetts.

Explanation of Plate 79.

All figures × 600.

Fig. 1. *Characium cylindricum*, cell containing 8 spores; e, spore escaping from lateral aperture; n, nucleus of spore; p, hyaline papilla at anterior end of spore.

Fig. 2. *Characium cylindricum*, empty cell with mature fungus sporangium (s) attached near distal end.

Fig. 3. *Characium gracilipes*, unicellular stage, with fungus cell (f) attached on side opposite the pyrenoid.

Fig. 4. *Characium gracilipes*, unicellular stage, a typical specimen; py, pyrenoid on convex side of cell; r, rhizoids.

Fig. 5. *Characium gracilipes*, 8 cells, distal and basal cells divided transversely; middle cells divided longitudinally.

Fig. 6. *Characium gracilipes*, 16 cells dividing to 32 cells by transverse division; all pyrenoids on convex side of cells; a typical condition.

Fig. 7. *Characium cylindricum*, cell containing 32 spores which are apparently motile.

Fig. 8. *Characium cylindricum*, cell developed into sporangium containing many small spores.
Fig. 9. *Characium gracilipes*, distal (x) and basal (z) ends of cell containing 64 spores; distal and basal cells divided transversely; other cells divided longitudinally.
Figs. 10, 11, 12 and 13. *Characium cylindricum*, unicellular stage; n, nucleus; ol, oil globules; two parietal chromatophores.
Fig. 14. *Characium gracilipes*, base of stipe, 2 rhizoids on one side.
Fig. 15. *Characium gracilipes*, base of stipe, two rhizoids, one of which is hooked.
Fig. 16. *Characium gracilipes*, base of stipe, two rhizoids dependent like pitch-fork.
Fig. 17. *Characium gracilipes*, base of stipe, 2 rhizoids, both hooked.
Fig. 18. *Characium gracilipes*, 2 rhizoids with numerous short branches.
Fig. 19. *Characium gracilipes*, 3 rhizoids, an unusual type.
Fig. 20. *Characium gracilipes*, 2 rhizoids, one shorter than the other.
Fig. 21. *Characium gracilipes*, 2 rhizoids with slight roughenings.
Fig. 22. *Characium gracilipes*, 2 rhizoids, the longest observed.
Fig. 23. *Characium cylindricum*, perforated distal end of cell containing spores; h, aperture.
Fig. 24. *Characium cylindricum*, cell containing 8 protoplasts, a typical specimen; n, nucleus.
Fig. 25. *Characium cylindricum*, a, base of cell attached to under side of main shaft of hair; c, base of cell attached to upper surface of main shaft of hair; b, base of cell attached to three of the smaller hairs.

Bartonia.— In hearty sympathy with every effort to give scholarly record to local floras we welcome the appearance of another American periodical, devoted as it appears chiefly to questions of taxonomy and plant-distribution. The new Bartonia, happily named and like most other Bartonias an annual, is edited by Mr. Stewardson Brown, who with Messrs. Joseph Crawford and Witmer Stone forms the Publication Committee of the Philadelphia Botanical Club. Its aims are to record in abstract the proceedings of the club and print short articles relating to the flora of the region about Philadelphia. The issue at hand is an admirably printed and completely indexed imperial octavo of 32 pages. In addition to introductory matter, the proceedings, history, and membership-list of the club, it contains the following articles: Botanical Trips to Northampton Co., Pa., by S. S. Van Pelt; Some Sand Dune Plants from Longport, N. J., by Joseph Crawford; and The Coastal Strip of New Jersey and the Rediscovery of Lilaeopsis, by Witmer Stone. Bartonia, dealing as it does with a flora closely related to that of our southwestern limits, will assuredly prove suggestive and interesting to botanists of New England.— B. L. R.

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,— IV.

The Local Flora Committee of the New England Botanical Club wishes to thank the botanists who have aided this work by contributing card-records covering their herbaria. The reports in regard to species included here have been considerably more numerous than those previously furnished, and it is hoped that the interest will continue.

No plant is included in this list unless it is known to be represented by at least one extant specimen. It has seemed best, however, to supplement such records, where they are few, by references drawn from the three principal local floras which cover parts of the region. There are also numerous citations from Baldwin's Orchids of New England, which are interesting and have therefore been included. These printed records are in each case given after the records of actual specimens reported to the Committee.

AMARYLLIDACEAE.

HYPOXIS.

H. hirsuta (L.) Coville. Open woods and fields, in dry and moist soils; common.

IRIDACEAE.

IRIS.

I. prismatica Pursh. Wet meadows and fresh-water marshes, also edges of salt marshes. Near the coast for the most part, but following up the Merrimac and its tributaries to Wilmington, Chelmsford, Billerica, Bedford, and Concord.

I. PSEUDACORUS L. Formerly established on Concord River, Concord (*Miss Hayward*, June 16, 1884. Specimen in herb. W. Deane); growing spontaneously in Lexington (*Mrs. P. D. Richards*, no date).

I. vérsicolor L. Wet meadows and swamps; common throughout.

SISYRINCHIUM.[1]

S. angustifolium Mill. Fields and meadows, apparently less frequent than the next species; 12 stations reported, running as far south as Milton and Hingham.

S. atlanticum Bicknell. Wet meadows and grassy woodland, common throughout.

S. gramineum Curtis. Charles River meadows in sphagnum, Dedham (*H. H. Bartlett*, July 4, 1907); dry scrub land, Franklin (*E. F. Williams*, June 17, 1897); Medford (*R. Frohock*, July 1, 1880); gravelly shore of West Pickerel Pond, Middlesex Fells (*Charles Eliot*, July 21, 1895); just above tide limit, river bank, Newburyport (*M. L. Fernald*, October 2, 1902); among bushes in pasture, Scituate (*G. G. Kennedy*, July 3, 1899).

ORCHIDACEAE.

ARETHUSA.

A. bulbosa L. Grassy and sedgy swamps and bogs, generally distributed throughout.

CALOPOGON.

C. pulchellus (Sw.) R. Br. Wet meadows, and grassy and sedgy swamps and bogs, generally distributed throughout.

CORALLORRHIZA.

C. maculata Raf. Saprophytic in woods, frequent northward, apparently rare in southern portion; the form with pale, unspotted lip, Milton (*G. G. Kennedy*, Aug. 4, 1894).

C. odontorhiza Nutt. Saprophytic in rich woods. Waltham (*E. H. Hitchings*, Sept. 10, 1889. Specimen in herb. N. E. Bot. Club); "six plants were found near Overbrook Hill [Stony Brook Reservation] in 1878" (according to Deane, Fl. Metrop. Park Comm. 77. 1896); "'Rare. Rather plentiful on the east side of the Edwards' Swamp' (*Tracy*)." (according to Robinson, Fl. Essex Co. 109. 1880); Roxbury (according to Baldwin, Orchids of N. E. 143. 1884).

[1] The species of this genus have been studied so little since their segregation that there is need of much more collecting and careful determination.

C. trifida Chatelain. Saprophytic in damp woods and swamps; occasional northward, also in Purgatory Swamp, Norwood, and Cedar Swamp, Walpole.

CYPRIPEDIUM.

C. acaule Ait. Dry woods, especially pine, sometimes in swampy woods; common. White-flowered form occasional.

C. hirsutum Mill. Cold swamps, Amesbury (*J. W. Huntington & R. Dodge*, 1906); Wenham (*J. H. Sears*, 1877 and 1885); Andover (*J. T. Dawson*, according to Robinson, Fl. Essex Co. 109. 1880); Reading (*Miss Clymena Wakefield*, according to Dame & Collins, Fl. Middlesex Co. 105. 1888); Danvers and Wilmington (according to Baldwin, Orchids of N. E. 144. 1884).

C. parviflorum Salisb. Deep woods. Acton (*J. R. Churchill*, May 20, 1880; *W. Deane*, June 27, 1885); Danvers, Wenham, and Swampscott (*J. H. Sears*, 1877 and 1885); Groton (*Miss H. E. Haynes*, according to Dame & Collins, Fl. Middlesex Co. 104. 1888); Westford, Methuen, West Haverhill, and Canton (according to Baldwin, Orchids of N. E. 144. 1884).

C. parviflorum Salisb., var. **pubescens** (Willd.) Knight. Woods and swamps. Ashland (*Miss E. F. Wiggins*, May, 1884); West Boxford (*Mrs. H. D. W.*, no date. Specimen in herb. N. E. Bot. Club); Dedham (*E. H. Hitchings*, June 6, 1879. Specimen in Gray Herb.); Holbrook (*E. F. Williams et al.*, May 30, 1902); Norwood (*A. W. Cheever*, June 4, 1904; *J. A. Cushman*, May 20, 1908); Stowe (*J. R. Churchill & W. Deane*, May 30, 1886); Lexington (according to Baldwin, Orchids of N. E. 144. 1884).

EPIPACTIS.

E. pubescens (Willd.) A. A. Eaton. Dryish woods, generally distributed throughout.

E. tesselata (Lodd.) A. A. Eaton. Rich woods, occasional in northern sections; occurring also at Dedham, North Easton, Norwood, and Walpole.

HABENARIA.

H. blephariglottis (Willd.) Torr. Wet open woods and bogs, occasional throughout.

H. ciliaris (L.) R. Br. Bogs and meadows. Dedham (*E. & C. E. Faxon*, Aug. 9, 1888; *E. H. Hitchings*, Aug., 1889; *G. G. Kennedy*, Aug. 5, 1894); Lexington (*W. Boott*, 1862); Sharon (*E. H. Hitchings*, July, 1871).

H. clavellata (Michx.) Spreng. Wet woods and swamps, occasional throughout.

H. fimbriata (Ait.) R. Br. Wet woods and grassy swamps, occasional.

H. flava (L.) Gray. Wet fields and woods, generally rare, but locally abundant.

H. Hookeri Torr. Dry or rich woods. Big Hill, Acton (*J. R. Churchill & W. Deane*, June 27, 1885); Georgetown (*Mrs. C. N. S. Horner*, no date); Middleton (*J. H. Sears*, no date); Bear Hill, Stoneham (*Mrs. P. D. Richards*, June 17, 1881); Hopkinton (*C. W. Swan*, according to Dame & Collins, Fl. Middlesex Co. 103. 1888); Blue Hill (according to Deane, Fl. Metrop. Park Comm. 79. 1896); West Boxford and Groveland (according to Baldwin, Orchids of N. E. 137. 1884).

H. lacera (Michx.) R. Br. Wet fields, meadows, and bogs, common.

H. orbiculata (Pursh) Torr. Rich woods northward, rare.

H. psycodes (L.) Sw. Wet meadows and swamps, common but not abundant.

LIPARIS.

L. liliifolia (L.) Richard. Wet woods, rare.

L. Loeselii (L.) Richard. Wet fields, rare.

LISTERA.

L. cordata (L.) R. Br. Deep mossy woods and bogs. "Not rare, Magnolia, Gloucester" (*C. J. Sprague & J. H. Sears*, 1880 and 1884); Purgatory Swamp, Norwood (*A. W. Cheever*, June 4, 1903); Great Swamp, Walpole (*J. R. Churchill*, May 30, 1887); West Boxford and Hamilton (according to Baldwin, Orchids of N. E. 140. 1884).

MICROSTYLIS.

M. unifolia (Michx.) B S P. Wet fields, bogs, and open woods, very rare. It has been found at various stations scattered over the area.

ORCHIS.

O. spectabilis L. Rich woods and swamps, very rare. Oak Island, Revere (*E. H. Hitchings*, 1874; *A. W. Cheever*, May 21, 1904); "Cambridge (T. W. Harris in Hovey's Mag., VI., 245). Concord, introduced from Vermont by Minot Pratt. May. Very rare." (according to Dame & Collins, Fl. Middlesex Co. 102. 1888); Hanover (according to Baldwin, Orchids of N. E. 136. 1884).

POGONIA.

P. ophioglossoides (L.) Ker. Wet meadows and bogs, common throughout.

P. verticillata (Willd.) Nutt. Rich moist woods. Lowell (*Miss K. Hill*, no date); Lynnfield (*E. H. Hitchings*, 1890); Purgatory Swamp, Norwood (*E. H. Hitchings*, May 30, 1878. Specimen in Gray Herb.); Milton and Quincy (collected by many botanists for many years); printed records from nine other widely scattered stations, mostly north of Boston.

SPIRANTHES.

S. Beckii Lindl. Dry soil. Holbrook (*A. Clark*, Sept. 12, 1900); Short St., Easton (*A. A. Eaton*, Sept. 2–12, 1903); North Easton near the Sharon line (*O. Ames*, Aug. 25, 1906). Material from all these gatherings now in herb. Oakes Ames. See Ames, Orchidaceae, fasc. i. 125. 1905.

S. cernua (L.) Richard. Wet fields and meadows, common throughout.

S. cernua (L.) Richard, var. **ochroleuca** (Rydb.) Ames. In dryer soil than the typical form of the species, and apparently as generally distributed.

S. gracilis (Bigel.) Beck. Dry fields and pastures, rather common.

× **S. intermedia** Ames. Dry fields, Easton (*A. A. Eaton*, Sept. 8, 10, 1903. Specimens in herb. O. Ames. See Ames, Rhodora, v. 261–263. 1903 and Ames, Orchidaceae, fasc. i. 153. 1905).

S. lucida (H. H. Eaton) Ames. Martin's Pond, North Reading (collector unknown, Aug. 8, 1882. Specimen in herb. N. E. Bot. Club, ex herb. W. H. Manning). See Ames, l. c. 144; Lynnfield and Newton (according to Baldwin, Orchids of N. E. 139. 1884).

S. vernalis Engelm. & Gray. Sandy roadside, Canton Road, Randolph (*J. R. Churchill*, Sept. 5, 1898. "So far as I know from authentic report your specimen . . . . is the most northerly as yet known." In litt. to J. R. Churchill, May 3, 1905, by Oakes Ames who examined the specimen); "in dry fields," Easton (*O. Ames, A. A. Eaton, & R. G. Leavitt*, Sept., 1904. Specimens in herb. O. Ames. See Ames, l. c. 134); Baldwin, in Orchids of N. E. 140. 1884, reports from Hanover *S. graminea*, var. *Walteri*, which may be this species.

C. H. Knowlton, J. A. Cushman, Walter Deane, A. K. Harrison — *Committee on Local Flora.*

NOLINA IN THE SOUTH ATLANTIC STATES.

Harley Harris Bartlett.

Nolina georgiana, the type species of the genus, was described in Michaux's Flora Boreali-Americana. The characterization is so concise and clear that, although the locality is given no more exactly than "Georgia," there can be no doubt as to the proper interpretation of the species. Nuttall knew it in the field, and said that it was "abundant towards Augusta, in Georgia." His description, agreeing perfectly with the common *Nolina* of the fall line sand-hills, is merely condensed from that of Michaux. Elliott extended the range into South Carolina.

Poiret's *Phalangium virgatum*, collected by Fraser in Carolina, subsequent authors have agreed in referring to *Nolina georgiana*, — a disposition which would seem extremely probable on geographic grounds, and which, moreover, is not controverted by any evidence in the original description.

As early as 1852 a plant was collected in East Florida, which Chapman and other botanists identified as *Nolina georgiana* and sent to their correspondents under that name. Although it turned up not infrequently, current manuals, down to the time that Small's Flora

was published, continued to repeat a traditional range, about as follows; — "Dry sand-hills in the middle districts of Georgia and South Carolina." It may be that Chapman doubted the identity of the Florida plant with *Nolina georgiana.* Watson, however, and then Small, included it with that species and extended the range to include Florida.

The rarity in herbaria of true *Nolina georgiana* may account for the very distinct species of Florida ever having been confused with it. My attention was called to the differences between the two when I attempted to determine, by direct comparison, a *Nolina* from the fall line sand-hills of McDuffie County, Georgia. Except for a few fruits from Columbus, Ga., collected by Boykin, all the specimens labeled *Nolina georgiana* in the Gray Herbarium were the Florida species, which was altogether unlike the McDuffie County specimen. This conclusion was confirmed by examining additional material from the National Herbarium, for the use of which I wish to thank Dr. Rose.

Mr. Nash based his *Nolina Brittoniana* upon Florida material. A cotype in the Gray Herbarium shows that its affinity is with *N. georgiana* rather than with the undescribed species. From both it may be clearly distinguished by several good characters.

Fruit not markedly asymmetric, sharply triangular in cross section. Pericarp inflated.
- Fruit cordate at both base and apex. Inflorescence closely branched. Leaves broad . . . . *N. Brittoniana.*
- Fruit obtuse at base and apex. Inflorescence distantly branched. Leaves narrow . . . . *N. georgiana.*

Fruit asymmetric, obtusely 3-lobed in cross section. Pericarp closely investing the seed of fertile carpels, scarcely inflated in the sterile ones. *N. atopocarpa.*

Nolina atopocarpa sp. nov. Rhizoma breve erectum, radicibus fibrosis numerosis. Caudex perbrevis vaginis defoliatis obtectus. Folia radicalia numerosa usque ad 1 m. longa, 3–4 mm. lata, glabra, margine scabra. Scapus saepe quam 1 m. altior, bracteis foliaceis deorsum paucis usque ad 7 cm. longis, sursum minutis setaceis praeditus, remote ramosus vel simplex. Pedicelli articulati, vel singuli vel bini vel trini fasciculati, bracteati, juventate inaequales ascendentes, aetate deflexi. Perianthium patens ca. 5 mm. diametro. Fructus ca. 6 mm. longus obovoideus, carpellorum abortu sterilium asymmetrus, leviter 3-carinatus, apice vix emarginatus vel rotundatus, basi angustatus perbreviter stipitatus, circumscriptione solum leviter trilobus nec triangulus. Pericarpium seminibus 1–2 levigatis appressum, nec inflatum.— Type specimen, *Curtiss 5702*, in Hb. Gray.

Specimens examined:

Nolina Brittoniana: — Florida: Vicinity of Eustis, Lake Co., *Nash 459.*

Nolina georgiana: — Georgia: Columbus, *Boykin*; Big Lott's Creek, Bulloch Co., *Harper 965*; Thomson, McDuffie Co., *Bartlett 1174.*

Nolina atopocarpa: — Florida: "East Florida," *Palmer 566*; St. Augustine, Apr. 1858, *Canby*; Tocoi and St. Augustine, June, 1876, *Garber*; 1872, *C. F. Powell*; Eau Gallie, Indian River, *Curtiss 2937 and 5702.*

Nolina Brittoniana sets fruit about the end of May. Its near ally, *Nolina georgiana*, growing further north, is a month later. *Nolina atopocarpa*, growing in the same latitude as *N. Brittoniana*, does not set fruit until July.

Gray Herbarium.

SOME RARE PLANTS FROM THE VICINITY OF WELLESLEY, MASSACHUSETTS.

K. M. Wiegand.

During the past summer the writer, with an assistant, was engaged in collecting and cataloging the Spermatophyta in the vicinity of Wellesley College for the college herbarium. Some three thousand sheets of plants were collected, and in this material when it came to be worked over were found a number of rare plants a few of which seemed to extend known ranges, while others were of comparatively rare occurrence in Eastern Massachusetts. It seemed best to record these stations in the following list:—

Scheuchzeria palustris L. Mud Pond, Natick; Westboro Swamp.

Sagittaria subulata (L) Buch., var. *gracillima* (Wats.) J. G. Smith. Waban Brook, Wellesley; Raceway at dam, Newton Lower Falls.

Panicum meridionale Ashe. Wellesley Campus, near barn. The writer has also found it on the Ipswich Sand Dunes. Not reported in the new Gray's Manual north of Connecticut.

Sphenopholis nitida (Spreng.) Scribn. Morse's Pond, Wellesley. An eastward extension of the range given in Gray's Manual.

Glyceria pallida (Torr.) Trin., var. *Fernaldii* Hitch. Dover; Westboro; Charles River near Wellesley and Needham. A southward extension of the range given in Gray's Manual.

Bromus inermis Leys. Field, Nehoiden St., Needham. Not reported in Gray's Manual from America, but introduced at Ithaca, N. Y. and probably elsewhere.

Cyperus filiculmis Vahl (typical). Wellesley Campus, near barn.

Eleocharis interstincta (Vahl) R. & S. Lake Waban, Wellesley.

Eleocharis quadrangulata (Michx.) R. & S. Lake Waban. Apparently not reported elsewhere north of Connecticut.

Eleocharis Engelmanni Steud. (typical). Pond, Mill St., Westwood; and Wayland Reservoir.

Carex hormathodes Fernald, var. *Richii* Fernald. Purgatory Swamp at Dedham Center Station.

Carex seorsa Howe. Needham Swamp, in shade.

Carex trisperma Dewey, var. *Billingsii* Knight. Moor of Mud Pond, Natick.

Microstylis unifolia (Michx.) BSP. Woods around Westboro Swamp.

Coronopus didymus (L.) Smith. Introduced in flower bed on Wellesley Campus.

Linum striatum Walt. Old railroad track under Elm St., Dedham.

Lechea Leggettii Brit. & Hollick. Border of Purgatory Swamp, Dedham. Apparently not before reported north of Nantucket.

Rotala ramosior (L.) Koehne. Pond across the railroad from the new college dormitories, Wellesley.

Apocynum medium Greene. Roadside near Waushacum Pond, So. Framingham; Speen St., Natick.

Cuscuta compacta Juss. Morse's Pond, Wellesley. Until recently not known in New England, but lately reported elsewhere in Eastern Massachusetts.

Stachys ambigua (Gray) Britton. Canal St. Medfield; Heard's Pond, Wayland; Great Plains Ave., Needham. Not previously reported north of Pennsylvania, but apparently not rare in this region.

Plantago media L. Found by New England Botanical Club party on the aqueduct near the tunnel north of Framingham; occurs also on a lawn in Wellesley.

Galinsoga parviflora Cav. Garden in Wellesley.

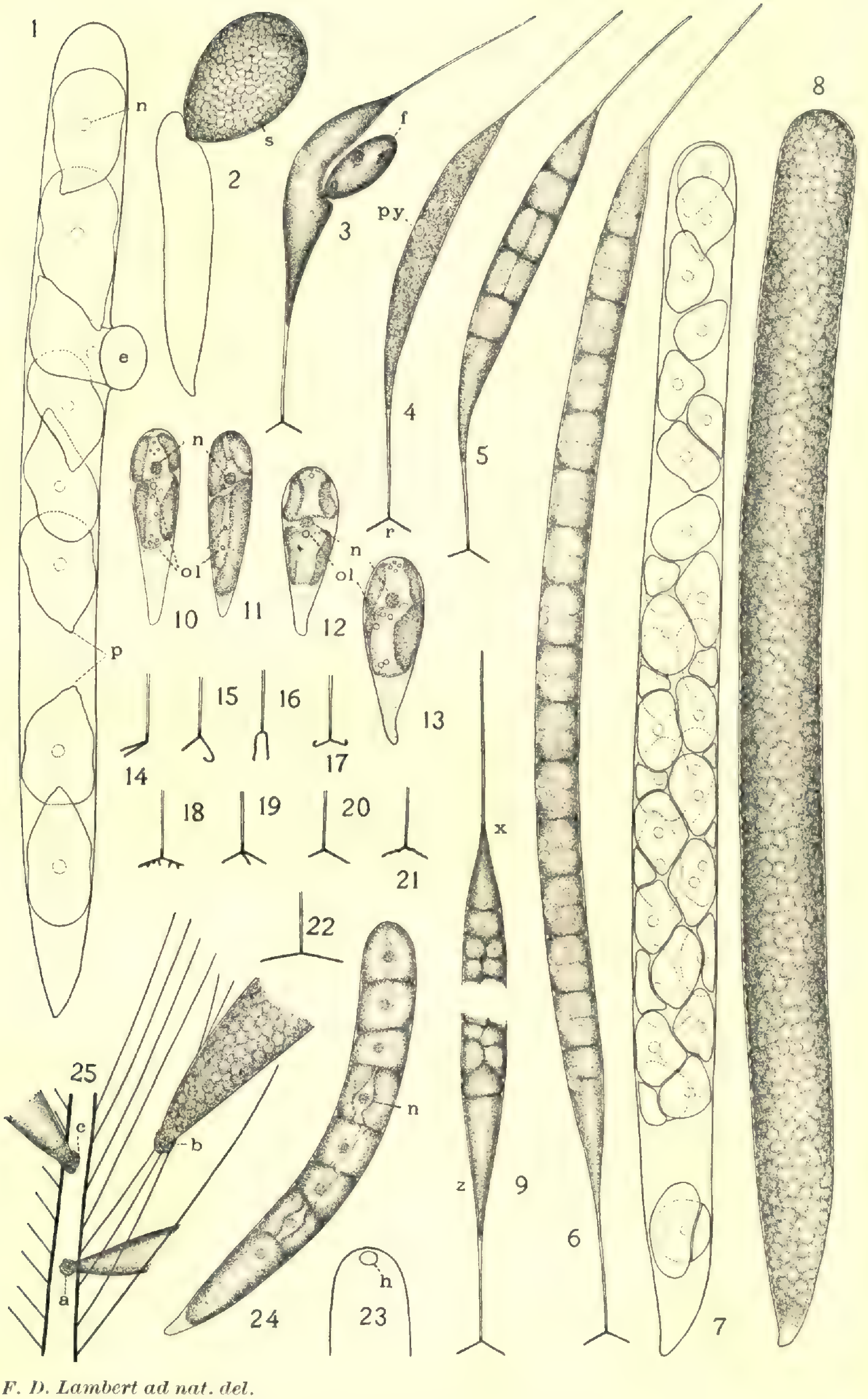
Hieracium marianum Willd. Near a saw mill west of So. Natick Probably native.

Wellesley College.

Note on the Report of Scirpus nanus from Vermont.— In the Preliminary List of New England Cyperaceae[1] published in August last I included *Scirpus nanus* Spreng. as reported from Vermont, although I had not seen specimens. The basis of this report was the earlier record of the plant as collected "near Willoughby Lake, *Walter Deane*," published in the Flora of Vermont[2] (under *Eleocharis pygmaea*), and later accepted by Dr. Kennedy in his Flora of Willoughby.[3] At the time I was preparing the Preliminary List of New England Cyperaceae Mr. Deane was absent from Cambridge and it was impossible for me to consult his specimens; consequently the species was credited to Vermont only on the basis of the published records. Subsequently I have examined the material with care and find that the plant upon which these records have been based is not *Scirpus nanus*, but a very dwarf form of *Eleocharis intermedia* Schultes. The — in the Preliminary List indicating the report of *Scirpus nanus* from Vermont should therefore be erased.— M. L. Fernald.

[1] Rhodora, x. 135–144 (1908).
[2] Brainerd, Jones, and Eggleston, Fl. Vt. 23 (1900).
[3] Kennedy, Rhodora, vi. 107 (1904)

Vol. 11, no. 123, including pages 33 to 64, was issued 6 April, 1909.



F. D. Lambert ad nat. del.

NEW SPECIES OF CHARACIUM.

Gray's New Manual of Botany — 7th Edition

An illustrated flora of the Northern United States and Canada east of the 96th meridian. By Asa Gray, LL.D., late Professor of Natural History, Harvard University. Thoroughly revised and largely rewritten by Benjamin Lincoln Robinson, Ph.D., Asa Gray Professor of Systematic Botany, and Merritt Lyndon Fernald, S.B., Assistant Professor of Botany, Harvard University, assisted by specialists in certain groups. With more than nine hundred text figures.

Regular Edition. Cloth, illustrated, 8vo, 928 pages. Price, $2.50.
Tourist's Edition. Limp leather, $5 \times 7\frac{1}{2}$ inches. Price, $3.00.

AMERICAN botanists, who have been impatiently awaiting the revision of this indispensable work, will be delighted to know that a seventh, completely revised, and copiously illustrated edition, is now ready. The revision has entailed years of work by skilled specialists. No effort or expense has been spared to attain the highest degree of clearness, terseness, and accuracy. The plant families have been rearranged in a manner to show the latest view of their affinities, and hundreds of species have been added to the flora. The nomenclature has been brought into thorough accord with the important international rules recently established — a feature of great significance. Indeed, the Manual is the only work of its scope which in the matter of nomenclature is free from provincialism and rests upon a cosmopolitan basis of international agreement. Nearly a thousand figures have been added, and scores of brief and lucid keys have been introduced in a manner which greatly simplifies the problem of plant identification. The work has been extended to include Ontario, Quebec, and the maritime provinces of Canada.

AMERICAN BOOK COMPANY
New York Cincinnati Chicago Boston

HOME GROWN LILIES.

Fresh from Beds. Wild Flowers, Hardy plants of all kinds.
Send for catalogue.

F. H. Horsford, Charlotte, Vt.

BIRDS OF MAINE

is the latest and most complete work on northeastern bird life. It is an illustrated work of 693 pages and contains descriptions of the plumage and full accounts of the nests, eggs, habits and general home life of 327 species of birds. As a book for the amateur or for the scientific student of bird life in northeastern America it is unexcelled. Sent prepaid on receipt of price, $3 50. Address all orders to

ORA WILLIS KNIGHT, 84 Forest Avenue, Bangor, Maine.

CAMBRIDGE BOTANICAL SUPPLY COMPANY,

WAVERLEY, MASS.

BOTANICAL SUPPLIES OF EVERY DESCRIPTION.

Samples of Driers and Mounting Papers sent on request.
ASK FOR NEW CATALOG, NO. 91.

STANDARD MATERIAL. IMMEDIATE SHIPMENT.
Physiological Instruments. How do Plants Work?

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB.

Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS
MERRITT LYNDON FERNALD
HOLLIS WEBSTER } Associate Editors.

WILLIAM PENN RICH
EDWARD LOTHROP RAND } Publication Committee.

Vol. 11. May, 1909. No. 125.

CONTENTS:

Notes upon the Flora of Newfoundland. *E. H. Eames* . 85

Some Lichens from Gaspe Peninsula. *L. W. Riddle* . . 100

Nomenclatorial Changes in Corallorrhiza. *Oakes Ames* . 102

Corylus rostrata and C. americana. *K. M. Wiegand* . . 107

Viola Brittoniana at Concord, Mass. *William Brewster* . 107

Lathyrus palustris, var. pilosus in Massachusetts.
K. M. Wiegand 108

Boston, Mass.
1052 Exchange Building.

Providence, R. I.
Preston and Rounds Co.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price $1.00 per year ($1.25 to all foreign countries including Canada); single copies 15 cents. Volume 1, $2.00, Vol. 2, $1.50. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

B. L. ROBINSON, 3 Clement Circle, Cambridge, Mass.

Subscriptions, advertisements, and business communications to

W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

Single copies may be had from

E. L. RAND, Corresponding Sec'y N. E. Botanical Club,
1052 Exchange Building, Boston, Mass.

Entered at Boston, Mass., Post office as Second Class Mail Matter

---

SYNOPTICAL FLORA OF NORTH AMERICA, by A. GRAY and others. Vol. I. Fascicles 1 and 2. A critical treatment of forty-five families of polypetalæ (*Ranunculaceæ to Polygalaceæ*) 1895-1897. $5.20.—GRAY HERBARIUM of Harvard University, Cambridge, Mass.

NEW ENGLAND WILD FLOWERS AND THEIR SEASONS, by WILLIAM WHITMAN BAILEY. Price 75 cents net.—PRESTON & ROUNDS CO., Providence, R. I.

WASHINGTON'S FLORA.

A few complete sets and some incomplete ones of my Fascicle XII of Washington Plants are still on hand; also specimens of many species distributed in earlier fascicles. Send for lists.

W. N. SUKSDORF - - Bingen, Wash., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collectors' memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3-4 in. 1 year $4.00, 6 months $2.50.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 11. May, 1909. No. 125.

NOTES UPON THE FLORA OF NEWFOUNDLAND.

Edwin H. Eames.

In quest of recreation in a region of interesting botanical possibilities Dr. Charles C. Godfrey and the writer journeyed to western Newfoundland in mid-July 1908. A study of pertinent literature proved the country little known except near the coast, larger streams and along the railway.

Few botanists have given any attention to the west coast, as it has until recently been comparatively inaccessible. In that region nearly all available information has been through the efforts of Rev. A. C. Waghorne, sometime resident at Birchy Cove, who, in pursuit of his missionary work, made many excursions to the outer coast and northward. As much of the material thereby accumulated still remains unworked in the light of present day knowledge it is not surprising that we are able to add to the known flora of the island upwards of fifty species and varieties of the higher plants, in part gathered within an area more or less familiar to our predecessor.

Our itinerary was as follows: — July 20–25, Aug. 9–10, about Humber Arm, Bay of Islands, in the vicinity of Birchy Cove; July 27–31, Aug. 7–8, shores, islands and lower mountain slopes about York Harbor, Bay of Islands; July 31–Aug. 6, summits and higher slopes of Blow-me-down Mts. immediately south of Bay of Islands (highest recorded altitude about 680 m.); Aug. 11–14, head of Bay St. George; Aug. 15, a forenoon at Port aux Basques.

In these areas the rocks and soils are mainly potassic in their essential influence upon plant-life, with occasional more or less calcareous composition or admixture, rarely an impure limestone. As similar conditions appear to prevail elsewhere our observations bear directly

upon the general flora. It should be remarked that a great area of serpentine forms the eastern part of Blow-me-down Mts. and some others visible to the north, but lack of time prevented their exploration.

Of some 600 numbers collected, representing about 400 species and varieties, it seems advisable to notice about half as possessing more or less real interest for other gleaners in the same or related fields. The flora is of much interest and, most decidedly, is worthy of long-continued field study.

For valued assistance in the determination of some otherwise doubtful species, and for other information, it is a pleasure to acknowledge the kindness of Prof. M. L. Fernald who was already familiar with the allied flora of the Gaspé coast and mountains.

Phegopteris polypodioides Fée. Common in several places about Bay of Islands, Humber Arm and Bay St. George.

P. Dryopteris (L.) Fée. Occasional in the same general area.

Asplenium Filix-foemina (L.) Bernh. Frequent or locally common nearly or quite to treeline.

Polystichum Braunii (Spenner) Fée. Rather rare or local about Bay of Islands and Humber Arm. At one station it occurred in two extreme forms, as regards the sori, with little tendency to intergrade: one with unusually large sori and indusia, the former becoming confluent at maturity; the other with the same organs comparatively minute but apparently of about the same number. There seem to be no correlative characters upon which to separate these forms.

Aspidium Filix-mas (L.) Sw. Border of wet woods near Birchy Cove, at about 65 m. alt., with the preceding species, *Onoclea Struthiopteris* and other ferns.

Cystopteris fragilis (L.) Bernh. Up to treeline in the mountains. Common at low altitudes. A form closely simulating *Woodsia obtusa* near sea-level along Humber Arm.

Onoclea Struthiopteris (L.) Hoffm. Rare. See note on *Aspidium*. No indications of fruiting fronds on Aug. 10 although the colony in this strangely conjoint habitat is vigorous.

Schizaea pusilla Pursh. Sphagnous marsh near the railway, Bay St. George, at about 10 m. alt. The plants were somewhat smaller than is usual in similar situations in New Jersey and as is sometimes the case there they were more or less associated with *Aster nemoralis*. As perhaps particularly indicating the situation may be named *Xyris montana, Juncus stygius, var. americanus* and *Bartonia*

iodandra, any of which may sometime lead to other "finds" of this fern. The island abounds in situations of the same character, this tract alone covering many square miles. Of other stations in Newfoundland that of Waghorne was "In bogs, borders of ponds, the quarry N. W. of the railway....about 70 miles from the Bay of Islands" [1] therefore about 125 miles from our station. The station of La Pylaie probably was on the French Islands.

Osmunda cinnamomea L. Occasional. Occurs almost to treeline in the mountains. Fertile fronds more or less sterile at the tip and sterile fronds with more or less incised inner pinnules were collected at York Harbor and at 400 m. alt. in the mountains.

Equisetum sylvaticum L. A colony of lusty plants with black stems, at sea-level near Birchy Cove.

E. fluviatile L., forma limosum (L.) Clute was abundant in shallow ponds at about 450 m. alt.

Lycopodium Selago L. and var. appressum Desv. Near sea-level at York Harbor; frequent in the mountains.

L. annotinum L., var. pungens Desv. Occasional and well-marked about mountain summits.

L. obscurum L., var. dendroideum (Michx.) D. C. Eaton. York Harbor, on slope at 60 m. alt.

L. sitchense Rupr. Occasional in moist grassy or shaded places above treeline to the highest summit.

Selaginella selaginoides (L.) Link. More or less common in moist sphagnum and on wet rocks, especially in hilly districts and in the mountains.

Isoëtes — probably *I. echinospora* Dur., var. *Braunii* (Dur.) Engelm. A few plants in a small pond at 450 m. alt.

Taxus canadensis Marsh. Occurs almost to treeline in the mountains.

Pinus Strobus L. This, the most valuable evergreen, has been almost exterminated in the region traversed, where the fir, white and black spruce are still abundant but seldom large enough to be of much value.

Juniperus communis L., var. montana Ait. Not uncommon on exposed rocky slopes up to the highest mountain summit.

J. horizontalis Moench. Frequent in various moist to dry exposed situations at all altitudes.

[1] See Bull. Torr. Cl. xxiii, 354.

Sparganium angustifolium Michx. Sea-level, Bay St. George and mountain ponds at 450 m. alt.

S. simplex Huds. Definitely noted at sea-level, Bay St. George, but in Newfoundland it appears to intergrade with the last.

S. hyperboreum Laestad. Plentiful in shallow water and on muddy shores of several ponds in the mountains at about 450 m. alt. Also near sea-level, Bay St. George.

Potamogeton bupleuroides Fernald. Pool slightly above tide-water, Bay St. George.

P. pectinatus L. Abundant in a cove, head of Bay St. George.

Alopecurus geniculatus L. Occasional near sea-level, throughout.

Oryzopsis asperifolia Michx. Rocky slope, Bay of Islands.

Agrostis alba L., var. maritima (Lam.) Meyer. Brackish meadows and sandy soils, Bay St. George.

Agrostis borealis Hartm. Near sea-level to bleak mountain summits, where it is dwarfed. It appears to connect with forms referred to *A. hiemalis* (Walt.) B S P. but this is a question for further study.

Agrostis borealis Hartm., var. **macrantha**, n. v., spiculis abnormaliter elongatis; lemmatibus glumas valde superantibus 4–6 (–8) mm. longis; arista supra mediam partem varie saepissime apicem versus affixa interdum brevi obsoletave.— Spikelets abnormally elongated; lemmas much exceeding the glumes, 4–6, rarely 8, mm. long; awn variously inserted above the middle, usually near the apex, sometimes short or obsolete.— Shelves and crevices on dry cliffs at about 175 m. alt., Blow-me-down Mts., 27 July, 1908: Eames & Godfrey.

Calamagrostis Pickeringii Gray. At all altitudes throughout especially above treeline. Local.

C. canadensis (Michx.) Beauv. Occasional at all altitudes.

C. canadensis (Michx.) Beauv., var acuminata Vasey. With the species and elsewhere in the mountains, but usually not well marked.

C. hyperborea Lange. Rare on the higher mountain slopes and summits.

Ammophila arenaria (L.) Link. In sand on and near the beach, Bay St. George.

Holcus lanatus L. Meadows, Birchy Cove.

Deschampsia flexuosa (L.) Trin. Dry soil at all altitudes, but rather local.

Danthonia spicata (L.) Beauv. Occasional at all altitudes.

Spartina Michauxiana Hitchc. Tidal shore, Governor's Island, Bay of Islands.

S. glabra Muhl., var. alterniflora (Loisel.) Merr. Tidal shore, head of Bay St. George.

Cynosurus cristatus L. Moist roadside, Birchy Cove.

Poa alpina L. Occasional. Near sea-level, Bay of Islands, some plants were 5 dm. tall with proportionately large panicles.

Poa trivialis L. Birchy Cove.

Glyceria grandis Wats. Plentiful in a hillside meadow at Birchy Cove.

G. borealis (Nash) Batchelder. Bay St. George.

Festuca rubra L., var. subvillosa Mert. & Koch. Meadows, Bay of Islands. Local.

Festuca rubra L., var. subvillosa Mert. & Koch, forma **vivipara**, n. f., pubescentia ut apud varietatem sed lemmatibus elongatis foliaceisque.— Pubescence as in the variety, the lemmas elongated and leaflike.— Meadow near sea-level on Governor's Island, Bay of Islands, 8 Aug., 1908: Eames & Godfrey, and about slides and cliffs up to the highest mountain summit.— Exactly parallel with var. *prolifera* Piper, which was not seen although the species occurs throughout.

Scirpus nanus Spreng. Brackish marshes, Bay St. George.

S. hudsonianus (Michx.) Fernald. Bay of Islands and in the mountains. Occasional at all altitudes.

S. subterminalis Torr. Pond near sea-level, Bay St. George.

S. rufus (Huds.) Schrad. Abundant in brackish marshes, Bay St. George. Also on sandy shores of a fresh-water pond near sea-level, in the same locality.

S. occidentalis (Wats.) Chase. Governor's Island, Bay of Islands.

S. rubrotinctus Fernald. Bay of Islands and Humber Arm.

S. atrocinctus Fernald. Bay of Islands.

S. atrocinctus Fernald, var. brachypodus Fern. Bay of Islands.

Eriophorum callitrix Cham. From sea-level to 500 m. in the mountains.

E. callitrix Cham., var. erubescens Fernald. More or less common at all altitudes, throughout.

E. tenellum Nutt. Occasional at low altitudes.

E. angustifolium Roth. From sea-level to mountain meadows above treeline.

E. angustifolium Roth., var. majus Schult. Near sea-level, Bay of Islands.

E. virginicum L. Frequent. In the mountains to 500 m. altitude.

Rynchospora alba (L.) Vahl. Throughout, especially at low altitudes.

Carex hormathodes Fernald, var. invisa (W. Boott) Fernald. Bay St. George.

C. leporina L. Meadow, Birchy Cove.

C. exilis Dewey. Gravelly shore of a pond at about 450 m. alt.

C. brunnescens Poir. Up to 375 and 425 m. alt.

C. trisperma Dewey. Mountain woods at 375 m. alt.

C. salina Wahl., var. cuspidata Wahl. Bay St. George.

C. rigida Good. Rare on mountain summits.

C. rigida Good., var. Bigelovii (Torr.) Tuck. Frequent in the mountains.

C. lenticularis Michx. Bank of woodland stream at 375 m. alt.

C. aurea Nutt. Springy bank at sea-level, Bay of Islands.

C. pauciflora Lightf. Frequent from near sea-level to 550 m. alt.

C. leptalea Wahl. Frequent, especially at low altitudes.

C. polygama Schk. Governor's Island, Bay of Islands.

C. gracillima Schwein. Bay of Islands.

C. gracillima Schwein., var. humilis Bailey. Occasional about Bay of Islands, where it appears to be a well-marked variety.

C. scirpoidea Michx. Exposed rocky slopes and bare summits, from 60 m. alt. upward.

C. deflexa Hornem. A few plants on a bleak mountain summit at 550 m. alt.

C. vaginata Tausch. Sparingly on a dry mountain summit at 500 m. alt.

C. paupercula Michx. Meadows and banks of streams at and above treeline in the mountains.

C. paupercula Michx., var. irrigua (Wahl.) Fernald. Frequent in bogs and meadows at all altitudes.

C. limosa L. Near sea-level, Bay St. George, and in a mountain bog at about 450 m. alt.

C. rariflora Smith. Common in a boggy marsh near sea-level, Governor's Island, Bay of Islands; occasional in similar places and about ponds in the mountains, to 450 m. alt.

C. castanea Wahl. Brookside thicket at 425 m. alt.

C. arctata Boott. Wet border of coniferous woods at 375 m. altitude.

C. Michauxiana Boeckl. Occasional. In the mountains to 450 m. altitude.

C. saxatilis L., var. rhomalea Fernald. Wet gravelly shore of a pond at about 450 m. altitude.

C. saxatilis L., var. miliaris (Michx.) Bailey. Sphagnous swamp near Birchy Cove.

Eriocaulon septangulare Withering. Shallow water of pools, 450–500 m. altitude.

Xyris montana Ries. Muddy borders of ponds and pools near sea-level, Bay St. George.

Juncus bufonius L., var. halophilus Buch. & Fern. Moist brackish sand, Bay St. George.

J. longistylis Torr. Forming a compact colony along a gravelly tidal shore, Bay of Islands. Not before known from east of Lake Huron.

J. pelocarpus Mey. Bay St. George.

J. articulatus L. Low altitudes throughout.

J. stygius L., var. americanus Buchenau. Sphagnous bogs at all altitudes. Locally plentiful.

Luzula campestr s (L.) DC., var. frigida Buch. At low altitudes throughout.

Tofieldia palustris Huds. Moist to dry calcareous slides and ledges, 60–80 m. alt., York Harbor.

T. glutinosa (Michx.) Pers. Frequent in seepy places above treeline.

Clintonia borealis (Ait.) Raf. Occasional throughout except at high altitudes.

Smilacina stellata (L.) Desf. Moist or dry places near sea-level, Bay of Islands.

S. trifolia (L.) Desf. Wet sphagnum at all altitudes.

Maianthemum canadense Desf. Occasional up to the highest summit, 680 m. alt.

Streptopus amplexifolius (L.) DC. Frequent in woods at all altitudes.

S. roseus Michx. In similar places and more plentiful.

Iris setosa Pall., var. canadensis Foster, forma **zonalis**, n. f., foliis transverse lineatis; lineis albis vel flavido-albis interdum plus

minusve rubro-marginatis.— Leaves with transverse white or yellowish white bands; these bands sometimes more or less bordered with red.—Sea-beach near Bay St. George Hotel and moist sand in its vicinity, head of Bay St. George, 12 Aug., 1908: *Eames & Godfrey*.

Sisyrinchium angustifolium Mill. Plentiful on Seal Island, Bay of Islands. Occasional at low altitudes throughout.

Cypripedium acaule Ait. Bay St. George.

Habenaria hyperborea (L.) R. Br. Several places about Bay of Islands and Humber Arm.

H. dilatata (Pursh) Gray. Abundant in some meadows at Birchy Cove. Occasional throughout.

H. clavellata (Michx.) Spreng. Shrubby bog at 125 m. alt. near Birchy Cove.

H. obtusata (Pursh) Richards. Frequent or locally common in mossy woods throughout.

H. orbiculata (Pursh) Torr. Bay of Islands and Bay St. George. Apparently rare.

H. blephariglottis (Willd.) Torr. Plentiful in a bog at Bay St. George. Many of the plants are var. *holopetala* (Lindl.) Gray. Lip, especially of the variety, often less than 6 mm. long.

H. psycodes (L.) Sw. Occasional at low altitudes. Usually 2–3 dm. tall.

Pogonia ophioglossoides (L.) Ker. More or less frequent in low bogs throughout.

Calopogon pulchellus (Sw.) R. Br. As the last.

Arethusa bulbosa L. As the preceding.

Spiranthes Romanzoffiana Cham. Frequent, especially at low altitudes.

Epipactis repens (L.) Crantz, var. ophioides (Fern.) A. A. Eaton. Rare about Bay of Islands but abundant in mossy spruce woods near Bay St. George Hotel.

Listera cordata (L.) R. Br. Frequent or sometimes common in mossy woods at all altitudes.

L. convallarioides (Sw.) Torr. As the last.

Microstylis unifolia (Michx.) B S P. Rare. Shrubby swamp near Birchy Cove; open sphagnous slope in the mountains at 450 m. altitude.

Salix vestita Pursh. Summit of a slide with northerly exposure at 680 m. altitude.

S. Uva-ursi Pursh. Common on mountain summits and some much lower exposures.

Myrica Gale L. Up to slopes well above treeline in the mountains.

Betula microphylla Bunge. Frequent on mountain slopes above treeline. Not before recorded from eastern North America although Prof. Fernald says "it is abundant as a subalpine large shrub or small tree on Mt. Albert and Table-top, Gaspé Co., Quebec, and we have it [in Gray Herb.] from Saguenay Co., Quebec." In Newfoundland it was seen only as shrubs about a meter or so tall, often forming thickets.

B. nana L., var. Michauxii (Spach) Regel. Common in wet places above treeline.

Comandra livida Richards. Occasional at low altitudes throughout.

Polygonum Roberti Loisel. Abundant in damp sand inside the beach, at one locality, head of Bay St. George. Not before definitely recorded from America.

P. viviparum L. About the higher mountain cliffs and on a slide at 70 m. altitude near York Harbor.

Salicornia europaea L., var. prostrata (Pall.) Fernald. Abundant on some of the tidal shores and marshes at Bay St. George.

Salsola Kali L. Bay St. George.

Spergularia rubra (L.) J. & C. Presl. Along the railroad at Port aux Basques, where probably introduced.

Spergula arvensis L. Abundant in some cultivated fields at Birchy Cove.

Sagina nodosa (L.) Fenzl. Locally plentiful on the pebbly beach, Bay St. George.

S. procumbens L. At low altitudes throughout.

Arenaria lateriflora L. Abundant on Seal Island, Bay of Islands; occasional elsewhere in the same locality.

Stellaria borealis Bigel. Low altitudes throughout.

S. humifusa Rottb. Abundant on some of the tidal shores and marshes, Bay St. George.

Nymphaea advena Ait., var. variegata (Engelm.) Fernald. Shallow ponds up to 500 m. altitude.

Ranunculus repens L. Often plentiful about the settlements.

Thalictrum polygamum Muhl., var. hebecarpum Fernald. Bay of Islands.

Anemone parviflora Michx. Moist to dry calcareous cliffs and slides at 60–80 m. alt., Bay of Islands.

Coptis trifolia (L.) Salisb. Common to treeline.

Caltha palustris L. Occasional throughout.

Actaea rubra (Ait.) Willd. Frequent or occasional throughout; in the mountains to treeline.

A. rubra (Ait.) Willd., forma neglecta (Gillman) Robinson. In similar situations at a few places in the mountains. On a shrubby slope at about 175 m. alt. it grew in dense clumps of many stems — 27 fruitful stems in one instance from a compact mass of knotted rootstocks. When growing singly the rootstocks were practically identical with those of the species, near which it grew in one case. In the locality first mentioned the species did not occur but was present some distance down the slope. This form appears to be a mere matter of color. *A. alba* is not known to occur on the island.

Cochlearia officinalis L. One plant on the beach, Bay St. George.

Drosera longifolia L. Occasional or frequent in swamps and on muddy shores at all altitudes.

Saxifraga aizoides L. Moist slaty rocks at sea-level, Humber Arm.

Mitella nuda L. Occasional at all altitudes to treeline.

Parnassia parviflora DC. Moist bank at sea-level, Bay of Islands.

Ribes oxyacanthoides L. Bay of Islands.

R. lacustre (Pers.) Poir. Bay of Islands and Humber Arm; locally common at low altitudes.

R. prostratum L'Her. Occasional throughout.

R. triste Pall. Occasional throughout.

Pyrus sitchensis (Roem.) Piper. Bay of Islands and Humber Arm. This, or perhaps in part *P. americana*, occurs throughout the region traversed.

P. arbutifolia (L.) L. f., var. atropurpurea (Britt.) Robinson. What appears to be this variety was found with and grading into *P. melanocarpa* at Bay St. George.

Amelanchier canadensis (L.) Medic. Bay of Islands and Humber Arm.

A. oligocarpa (Michx.) Roem. Frequent in the Mts.

Filipendula Ulmaria (L.) Maxim. Birchy Cove.

Geum rivale L. Occasional at low altitudes.

Rubus Chamaemorus L. Bay of Islands and southward, in sphagnous bogs at all altitudes. Somewhat local.

Agrimonia striata Michx. York Harbor.

Rosa virginiana Mill. Bay of Islands.

Vicia Cracca L. Birchy Cove.

Lathyrus maritimus (L.) Bigel. As observed at Bay of Islands and Bay St. George this species-group was perplexing, many plants being markedly pubescent, others much less so or glabrous. Later studies have shown that Seringe, who was familiar with the two extremes, interpreted the *Pisum maritimum* of Linnaeus as the common *pubescent* plant of northern Europe and Asia, distinguishing as a variety, *P. maritimum*, "*β. glabrum* (Ser. mss.) foliis glabris.— In Canada."[1] In Newfoundland as elsewhere on the northern coast the pubescent plant is rather more common than the plant with glabrous foliage (as well as stem, etc.). Southward and about the lakes of the interior (Oneida L., the Great Lakes, L. Winnipeg) and on the coast of British Columbia, Washington and Oregon the glabrous plant alone is found. The latter, therefore, seems to be a well developed American variety and should be known as *L. maritimus* (L.) Bigel., var. **glaber** (Seringe) n. comb.

L. palustris L., var. pilosus (Cham.) Ledeb. Frequent about Bay of Islands.

Empetrum nigrum L., var. andinum (Philippi) DC. Local, although sometimes plentiful, on dry exposed slopes and summits from about 40 m. altitude at Port aux Basques to the higher mountain summits, usually in fine angular gravel about rocks and ledges. It is closely prostrate, usually in compact mats, in marked distinction to the habit of the species. In Newfoundland this variety appears to be farther removed from the species than elsewhere known in northeastern America, especially in the smaller mature fruit (3-5 mm. in dia.) which is *light* red, in large part a mere tint of the translucent skin covering the juicy almost colorless pulp. Other characters are less tangible and, like the tomentum, appear to be due to its habitat. Such characters are restricted annual growth and smaller leaves less rugose in drying or remaining turgid and lucid. Leaves of the season have comparatively and actually longer and more slender petioles. In studying various specimens of the species it was noted that on vigorous stems the leaves sometimes are exactly verticillate, more often subverticillate, in 3^s–6^s with marked internodes of 4-5 mm. It is *polygamous.*

[1] Ser. in DC., Prodr. ii. 368 (1825).

Nemopanthus mucronata (L.) Trel. Bay of Islands and Humber Arm; frequent, sometimes to treeline.

Rhamnus alnifolia L'Her. Occasional.

Malva moschata L. Birchy Cove.

Hypericum boreale (Britt.) Bickn. Bay St. George.

H. virginicum L. Bay of Islands and Bay St. George.

Viola cucullata Ait. Bay of Islands and in the mountains at 450 m. altitude.

V. Selkirkii Pursh. Bay of Islands and Humber Arm.

V. pallens (Banks) Brainerd. Bay of Islands and in the mountains to 425 m. altitude.

V. incognita Brainerd. Throughout except at the highest altitudes.

V. labradorica Schrank. Occasional in the mountains to the highest summits.

Shepherdia canadensis (L.) Nutt. Bay St. George.

Epilobium palustre L. Occasional throughout.

E. palustre L., var. monticola Haussk. Frequent throughout. Often grading into the species or not well marked.

E. adenocaulon Haussk. Bay of Islands and Humber Arm.

E. Hornemanni Reich. Occasional in the mountains to treeline.

Aralia hispida Vent. Bay of Islands.

Aralia nudicaulis L. Bay St. George.

Conioselinum chinense (L.) BSP. Occasional throughout, from sea-level to treeline.

Angelica atropurpurea L. Seal Island, Bay of Islands.

Cornus stolonifera Michx. Bay of Islands to treeline in the mountains.

Pyrola minor L. Bay of Islands and Humber Arm.

P. secunda L., var. obtusata Turcz. Bay of Islands and Bay St. George; less common than the species.

P. chlorantha Sw. Bay of Islands, Humber Arm and Bay St. George.

P. americana Sweet. A few plants about slides and cliffs on Little Blow-me-down Mt., at about 70 m. altitude.

Monotropa uniflora L. Bay of Islands. Not rare at Bay St. George.

M. Hypopitys L. Bay St. George.

Rhododendron canadense (L.) BSP. Low or moderate altitudes throughout.

R. LAPPONICUM (L.) Wahl. A few plants on calcareous ledges at 60 m. alt., Bay of Islands.

LOISELEURIA PROCUMBENS (L.) Desv. At about 40 m. alt., Port aux Basques, to mountain summits.

KALMIA ANGUSTIFOLIA L. Common throughout.

K. POLIFOLIA Wang. As the last, especially in the mountains.

CASSIOPE HYPNOIDES (L.) D. Don. Cliffs with northerly exposure, 680 m. altitude.

ANDROMEDA GLAUCOPHYLLA Link. Bogs at all altitudes throughout.

CHAMAEDAPHNE CALYCULATA (L.) Moench. As the last.

EPIGAEA REPENS L. Woods throughout.

ARCTOSTAPHYLOS UVA-URSI (L.) Spreng. Occasional at all altitudes.

A. ALPINA (L.) Spreng. Barren rocky hills at 40–50 m. alt., Port aux Basques; mountain slopes and summits. Fruit becoming black, plentiful.

CHIOGENES HISPIDULA (L.) T. & G. Low altitudes throughout.

GAYLUSSACIA DUMOSA (Andr.) T. & G. Bay St. George.

G. BACCATA (Wang.) C. Koch. Bay of Islands; Bay St. George.

VACCINIUM PENNSYLVANICUM Lam. At low altitudes throughout.

V. PENNSYLVANICUM Lam., var. ANGUSTIFOLIUM (Ait.) Gray. Exposed rocks and mountains throughout.

V. ULIGINOSUM L. As the last. Common.

V. OVALIFOLIUM Sm. Moist rocky woods at 400 m. alt.

V. OXYCOCCUS L. Throughout.

V. MACROCARPON Ait. Bay St. George.

DIAPENSIA LAPPONICA L. Rocky hills at Port aux Basques within 40 m. of sea-level, and on mountain summits. Local.

PRIMULA FARINOSA L., var. MACROPODA Fernald. Frequent on calcareous rocks and banks at sea-level and low altitudes.

P. MISTASSINICA Michx. As the last.

TRIENTALIS AMERICANA (Pers.) Pursh. Frequent in woods; occasional on mountain summits.

GENTIANA AMARELLA L., var. ACUTA (Michx.) Herder. Sandy field, Bay St. George.

HALENIA DEFLEXA (Sm.) Griseb., var. BRENTONIANA (Griseb.) Gray. Near sea-level at Port aux Basques and about Bay St. George.

BARTONIA IODANDRA Robinson. Muddy shores and sphagnous bogs about Bay St. George. Abundant in one bog, associated with *Melampyrum lineare.*

Menyanthes trifoliata L. Ponds up to 450 m. alt.

Myosotis scorpioides L. Birchy Cove.

Scutellaria lateriflora L. Bay of Islands and Humber Arm.

Scutellaria galericulata L. As the last.

Galeopsis Tetrahit L. Locally plentiful at Birchy Cove.

Lycopus uniflorus Michx. Bay of Islands.

Scrophularia nodosa L. A thrifty colony of many plants on rocky bank of Humber Arm near Birchy Cove. Not before recorded from North America.

Chelone glabra L. Bay St. George.

Mimulus moschatus Dougl. In several wet places, Birchy Cove.

Castilleja pallida (L.) Spreng., var. septentrionalis (Lindl.) Gray. Calcareous slide at 60 m. alt., Bay of Islands.

Melampyrum lineare Lam. Plentiful in a bog at Bay St. George.

Euphrasia Randii Robinson. Throughout, especially at low altitudes. In dry exposed places passing into var. Farlowii Robinson.

Utricularia vulgaris L., var. americana Gray. Bay St. George.

U. intermedia Hayne. Bay St. George.

U. cornuta Michx. Frequent throughout.

Pinguicula vulgaris L. Throughout.

Orobanche uniflora L. Bay of Islands; rare.

Galium kamtschaticum Steller. Several places on mountain slopes up to treeline.

G. labradoricum Wiegand. Bay of Islands.

G. asprellum Michx. Bay of Islands.

G. triflorum Michx. Bay of Islands and Humber Arm; frequent.

Lonicera caerulea L., var. villosa (Michx.) T. & G. In the mountains to 550 m. alt.— above treeline.

Viburnum pauciflorum Raf. More or less common about Bay of Islands and Humber Arm.

V. cassinoides L. Occasional throughout, up to treeline.

Sambucus racemosa L. York Harbor.

Lobelia Dortmanna L. Pond at 475 m. alt.

Eupatorium purpureum L., var. maculatum (L.) Darl. Edge of bog, Governor's Island, Bay of Islands.

Solidago hispida Muhl. At all altitudes. Frequent on mountain slopes and summits.

S. macrophylla Pursh. Woods at all altitudes; sometimes in open bogs.

S. macrophylla Pursh, var. thyrsoidea (Mey.) Fernald. Upper slopes in the mountains.

S. uliginosa Nutt. Bay St. George.

S. uniligulata (DC.) Porter. At all altitudes. Frequent on moist slopes and some summits in the mountains.

Aster radula Ait. Common at low altitudes; occasional on the upper mountain slopes. Passes freely into var. strictus (Pursh) Gray.

A. puniceus L., var. oligocephalus Fernald. At and near treeline in the mountains.

A. umbellatus Mill. Shrubby brookside at about 375 m. altitude.

A. nemoralis Ait. Common at low altitudes; occasional above treeline in the mountains.

Erigeron hyssopifolius Michx. Moist calcareous cliffs on Little Blow-me-down Mt., from 50 m. upward.

Anaphalis margaritacea (L.) B. & H., var. occidentalis Greene. Plentiful at York Harbor.

Gnaphalium sylvaticum L. Along the railway, Birchy Cove.

Senecio vulgaris L. Common in settled districts.

S. aureus L. Occasional throughout.

S. Balsamitae Muhl. Bay of Islands and Humber Arm. Occasional at all altitudes in the mountains, usually more or less depauperate on the summits and in dry soils — var. pauperculus (Michx.) Fernald.

Cirsium muticum Michx. Bay of Islands and in the mountains to treeline

C. muticum Michx., var. subpinnatifidum (Britt.) Fernald. Bay of Islands.

Centaurea nigra L. All settled districts.

C. nigra L., var. radiata DC. Birchy Cove.

Leontodon autumnalis L. Birchy Cove. Much less common than var. pratensis (Link) Koch.

Prenanthes trifoliolata (Cass.) Fernald. Bay of Islands, especially at low altitudes.

P. nana (Bigel.) Torr. Open places at all altitudes in the mountains.

Bridgeport, Connecticut.

NOTES ON SOME LICHENS FROM THE GASPÉ PENINSULA.

Lincoln Ware Riddle.

Through the courtesy of Prof. J. F. Collins I have recently had the opportunity of studying a set of Lichens collected by him in company with Prof. Fernald in the Gaspé region of eastern Quebec. The collection laid no claim to being exhaustive, as the specimens were mostly picked up incidentally, attention being given chiefly to other groups of plants. Most of the numbers as might be expected were typical boreal species, such as *Cetraria nivalis* (L.) Ach., *Nephroma arcticum* (L.) Fr., *Cladonia deformis* (L.) Hoffm., *C. gracilis* var. *chordalis* (Flke.) Schaer., and *C. turgida* (Ehrh.) Hoffm. But among the set were some species of special interest.

The first two species are of interest on account of their geographical distribution in North America. Prof. Fernald has already called attention to the interesting discovery in the Gaspé Peninsula of species of Phanerogams known elsewhere only from the Rocky Mountains or the Pacific Coast. A similar distribution is illustrated by the following species of Lichens.

Biatora globifera (Ach.) Fr. This species is widely distributed in the Pacific Coast and Rocky Mountain region, material having been examined from the following localities: — Washington (*Brandegee*), Oregon (*Suksdorf*), California (*Bolander, C. R. Orcutt, W. G. Farlow, H. E. Hasse*), Nevada (*S. Watson*), Colorado (*Brandegee, F. E. Clements.*) The only station hitherto known east of the Rocky Mountains is Smuggler's Notch, Mt. Mansfield, Vermont, where it was collected by C. G. Pringle. To this may now be added Bic, Rimouski County, Quebec, July 4, 1907 (*Collins & Fernald*, no. 4864).

Lecidia coeruleonigricans (Lightf.) Schaer. (*Lecidia vesicularis* (Hoffm.) Ach.) This is apparently a rarer species than the preceding. Material has been examined from Utah (*S. Watson, J. A. Lapham*), Colorado (*C. G. Pringle*), California (*C. R. Orcutt*). The only station known in eastern North America is Bic, Quebec, where it was collected by C. G. Pringle in 1880, and again in the same locality by Collins and Fernald (no. 4847a) July 4, 1907.

The next two numbers are boreal species which are little known south of the St. Lawrence River.

Solorina crocea (L.) Ach. Table-top Mountain, Gaspé County, Quebec, Aug. 10, 1906 (*Collins & Fernald,* no. 4502a). Widely distributed in British America, but not previously recorded from south of the St. Lawrence and no further herbarium material seen.

Sphaerophorus fragile Pers. Table-top Mountain, Gaspé County, Aug. 5, 1906 (*Collins & Fernald,* no. 4365). This is only the third station known south of the St. Lawrence, the others being Mt. Katahdin, Maine (*Blake, E. D. Merrill*) and the White Mountains, N. H. (*Tuckerman, W. G. Farlow, Clara E. Cummings*).

The two species next to be mentioned are represented in the collection by unusual forms.

Placodium elegans (Link) DC. var. granulosa Schaer. According to the description no. 4844 from Ile au Massacre, Bic, is this variety. No other herbarium specimens have been seen, and the variety has not been previously recorded from North America. It differs from the typical form in having the cortex of the central portion of the thallus broken up into a mass of pale granules. From the variety *trachyphyllum* of Tuckerman it is quite distinct in being truly foliose and loosely attached to the substratum.

Physcia ciliaris (L.) DC. var. crinalis Schaer. This is a comparatively well-known British American lichen, material having been examined from the following localities: — Newfoundland (*Delise*), Nova Scotia, Gaspé Coast, Ontario (*Macoun*), Bic, Quebec (*C. G. Pringle*), Lake Superior (*C. G. Loring*). It is rare from the United States, material having been seen only from Vermont (*C. C. Frost, C. E. Faxon*) and Michigan (*M. L. Wilson*). No. 27 of Calkins's North American Lichens from Tennesee, bearing this name, is *Physcia leucomela* (L.) Michx. Collins & Fernald's no. 5138 from Bic is the characteristic form of the variety. But no. 5268 from Bonaventure Island, off the easternmost point of the Peninsula, is a very peculiar form, being erect-fruticose, and occurring in intricately branched, congested tufts, giving the specimens an entirely different appearance from any other material examined, so different in fact that I failed to recognize it and I am indebted to Prof. Farlow for pointing out its relationships.

The last species worthy of notice is at the same time the most puzzling. It may be called provisionally

Collema plicatile Schaer. since it agrees most closely with the only specimens bearing this name in the Tuckerman Herbarium. One

of these is from North Baltimore, New York (*E. C. Howe*, 1871); the other from Willoughby Lake, Vermont (*W. G. Farlow*, 1880). The specimens now under consideration were collected by Collins & Fernald at Ile au Massacre, Bic, July 3, 1907 (no. 4842). The members of the group of *Collema pulposum* are variable and are not well-known in North America. Prof. Fink distributed specimens from Iowa under the name of *Collema plicatile*, but they are different from the specimens cited above. Dr. Herre, in his account of the Lichens of the Santa Cruz Peninsula, California (Proc. Wash. Acad. Sci. **7**: 378) lists a plant under the name of *Collema plicatile* Acharius, the determination being verified by Zahlbruckner. Judging from the description, however, the California plant is also different from the material in the Tuckerman Herbarium. If this doubt in regard to the North American material of *Collema plicatile* is taken into consideration, all that can be said is that the Bic specimens apparently agree with the Tuckerman conception of the species.

Specimens of all of the species mentioned are in Prof. Collins' herbarium and duplicates are in my own herbarium.

Wellesley College, Wellesley, Massachusetts.

RECENT NOMENCLATORIAL CHANGES IN THE GENUS CORALLORRHIZA.

Oakes Ames.

C. maculata and C. Wisteriana.

The adoption of the International Rules governing botanical nomenclature by the editors has produced in Gray's *New Manual of Botany* a number of changes, in the names of the genera and species, the origin of which, in the *Orchidaceae* at least, is readily traceable. In the majority of cases these changes have been made in strict accordance with the laws of priority, and the identity of the plants in question indisputably ascertained. The disappearance, however, of *Corallorrhiza multiflora* Nutt., from among the familiar names used in the sixth edition of the Manual, while necessitated by the rules adopted

at Vienna in 1905, deserves explanation in view of the fact that the identity of the plant, designated by the new name (*C. maculata* Raf.), has been obscured by a difference of opinion. Prof. E. L. Greene assumes that Rafinesque's *C. maculata* is conspecific with *C. Wisteriana*, a species described by Conrad in 1829, while I, reasoning from the same data, maintain that it more properly includes *C. multiflora*. Unfortunately the only evidence that may be considered is of a purely literary nature, as no type specimen of Rafinesque's species is known to exist. Rafinesque published two brief notes on the subject in the *American Monthly Magazine* (1817) which in the order of their appearance are printed below.

"*Cymbidium corallorhizon* is again introduced in the American Flora, after being left off by Pursh, and is distinguished from the *C. odontorhizon*, by its oblong acute and undivided lip; both are stated to have a white leafless sheathed stem. We apprehend there is here an oversight, or a new species is probably meant; we know of a third one unnoticed by Pursh, which has yellow stems, and a spotted elliptic obtuse crenate lip. We think those plants may form a peculiar genus very distinct from *Cymbidium*, to which the name *Cladorhiza* may be given: our new species shall be called *Cl. maculata*." Am. Mon. Mag. **1**: 429 (1817).

In the second note Rafinesque goes into more details and gives the following description.

"*Coralorhiza maculata*. Roots branched palmate articulate, stem round, sheaths acute; raceme loose, flowers drooping, sepals lanceolate, nearly obtuse, labellum recurved elliptic white, red spotted, auriculated on each side of the base, toothed and obtuse at the apex.— Obs. The genus *Coralorhiza* has been established by Brown, in the second edition of Hortus Kewensis: it is very different from *Cymbidium*, and its habit is very peculiar, owing to the branched shape of the fleshy roots and the pedunculated flowers without bracteas. Three or four species of this genus grow in the United States, all different from the European species. This grows in the shady woods of Long-Island near Flatbush, Flushing, Oyster-bay, &c; it blossoms in July and August, the whole plant is yellowish, size about one foot." Am. Mon. Mag. **2**: 119, 120 (1817).

From an examination of these two notes it becomes quite apparent that the one published first is scarcely a valid botanical description. It would prove of very slight use in the identification, absolutely with-

out doubt, of any known species of Corallorrhiza which has a spotted lip. After reading the second note, however, it becomes clear that if the *C. maculata* therein described is the same species as the one referred to in the first note, there is sufficient evidence for a scrutinizing study of the situation. The second note, in fact, offers the only satisfactory clue that is at all reliable, by which we may hope to obtain knowledge of the species which Rafinesque had in hand. It would be purely gratuitous to assume that the plant of the first note published by Rafinesque was a distinct species from that of the second note. It is not likely that Rafinesque's extraordinary powers of discernment would have let him confuse two such distinct species as the *C. multiflora* of the sixth edition of the Manual and *C. Wisteriana.*

After eliminating *Corallorrhiza striata*, which, from its range and striated flowers, is negligible in the present discussion, let us, for the sake of convenience separate the species of Corallorrhiza of the eastern United States into two sections, one characterized by an entire, the other by a three-lobed lip. In the first section we find *C. odontorhiza* and *C. Wisteriana,* and in the second *C. trifida* and *C. multiflora.* If we now turn to Rafinesque's description of *C. maculata* we find the lip clearly described in the second note as being "recurved elliptic white red spotted, auriculated on each side of the base, toothed and obtuse at the apex." A flower with an "auriculated" lip surely does not suggest either of the species in the first section of our arbitrary division. And if we attempt to identify it with the species of the second section we find that it is not in agreement with *C. trifida*, and is, therefore, either a distinct species or conspecific with *C. multiflora.*

If all the evidence is examined it will be found that Rafinesque in his second note, and Conrad in the original diagnosis of *C. Wisteriana* gave details relative to the flowering season and distributions of their plants which are worthy of careful consideration by one who wishes to ascertain the identity of *C. maculata* and *C. Wisteriana.* Conrad says of his plant that it "flowers the beginning of the 5th month" (*May*). Rafinesque, on the other hand, had to do with a species which blooms in *July* and *August*, in the "shady woods of Long Island, near Flatbush, Flushing, Oyster-bay, etc." An examination of numerous specimens of *C. Wisteriana* has conclusively proved to my mind that it is a *vernal* species, which has a flowering season from *February* into *May*, and that it is, for the most part, a southern species, which is fairly common in several of the states of the far south reaching into

Florida and westward into Texas. Furthermore, *C. Wisteriana* is *extremely rare* northward. When I prepared the monograph of that species for the first volume of *Orchidaceae* I examined many specimens to ascertain its geographical range, and found none from farther north than Georgia and Alabama, with the exception of the type, although in the literature devoted to it I found several reports of more northern localities almost all of which were without much doubt based on erroneously identified material. With the exception of a very questionable report for New England, the only northern station which deserves serious consideration is the type station near Philadelphia. No authentic material has ever been found in New York that I have been able to discover, while *C. multiflora* is common there. In the distribution of the species prepared for Gray's New Manual I judged that Pennsylvania and southward was the only statement warranted by my investigation. Rafinesque's second note would seem to refer to a plant of not uncommon occurrence in New York, otherwise he would not have named three stations and then have indicated, by "&c.," that others were known to him. Besides it would be most remarkable if in 1817 *C. Wisteriana* were common in the vicinity of New York and at the present time unknown from there.

It is also noteworthy that Rafinesque makes no mention of Philadelphia in either of his notes. In view of this Prof. Greene's remarks with which he concludes his brief reference to *C. maculata* in *Leaflets* (**1**: 237) are of interest. He says: "As a frequent plant in woods on the outskirts of the Philadelphia of the early nineteenth century, it might be expected that Rafinesque would have been the first to note its character, for he was familiar with the Philadelphia region at that time."

In the seventh volume of *Torreya* on page 78, Homer D. House takes exception to Prof. Greene's conjectures about the locality from which Rafinesque's plants of *C. maculata* were obtained and calls attention to the second note relative to the species in which Rafinesque referred definitely to the localities on Long Island. House concludes his brief account in the following words: "This (the Long Island station) gives a definite type locality for the species and it would be interesting to know whether the species is still to be found in the localities indicated by him (*Rafinesque*)."

In view of the foregoing discussion, in which I have laid especial stress on the season of flowering and on the geographical distribution of the two species under consideration there is no evidence which in

my opinion warrants the conclusion that *C. Wisteriana* is conspecific with *C. maculata*. The data furnished by Rafinesque's second note, however, are conclusive evidence, that his *C. maculata* is conspecific with *C. multiflora*, and is on account of its priority the proper name for the species.

Corallorrhiza trifida *Chatelain.*

Robert Brown in Aiton's *Hortus Kewensis*, ed. 2, vol. 5, p. 209 (1813) first used the combination *Corallorrhiza innata*, but J. J. Chatelain had in 1760, in a small pamphlet of fifteen pages, entitled *Specimen Inaugurale de Corallorhiza*, properly made the combination *C. trifida*. Chatelain's combination, through the rules of priority, is, therefore, valid while Brown's becomes a synonym. Linnaeus in *Species Plantarum*, edition of 1753, page 945, published the combination *Ophrys corallorhiza* so that the first specific name of our plant is "*corallorhiza*," but the transfer of the Linnaean specific name to the genus Corallorrhiza gives the combination *Corallorrhiza corallorhiza* which was first made by Karsten in 1880–1883. According to Section 6, Art. 55 of the International Rules for Botanical Nomenclature specific names which repeat the generic name must be rejected. If we apply this rule in the present case we must reject Karsten's combination and reinstate that of Chatelain. As Chatelain's pamphlet is rare and may not be readily accessible to those who wish to study the subject in detail, the following transcript from the first half of Page 8, on which the combination *C. trifida* is made, may prove of value.

SPECIES PRIMA.

Trifida. Corallorhiza nectarii labio trifido.

Ophris bulbis ramosis flexuosis, caule vaginato, nectari. labio trifido. Linn. sp. plant. pag. 945. No. 2 & Flori Suec. Edit. 2. pag. 317. No. 816.

Neottia bulbis reticulatis, nectarii labio trifido. Linn. Act. Ups. 1740. pag. 34. Flor. Suec. Edit. 1. pag. 267. No. 743. & Wachendorff. pag. 316. No. 886.

Neottia radice reticulata. Linn. Flor. Lapp. pag. 247. No. 315. Royen. Lugdb. pag. 15. No. 1.

North Easton, Massachusetts.

RECOGNITION OF CORYLUS ROSTRATA AND CORYLUS AMERICANA.— It is frequently desirable to recognize these two species in the winter, or in the spring while in flower. The writer has found the following characters useful in this respect.

C. AMERICANA. Staminate catkins almost always peduncled; their scales tipped with a long reddish point which bears hairs that project little or not at all beyond itself; buds decidedly obtuse and rounded at the apex; twigs frequently, but not always, bearing scattered bristly hairs. In flower, the bracteoles behind each scale of the staminate catkin project conspicuously beyond the lateral margins of the latter, and the previously noted apical characters of the scale still hold.

C. ROSTRATA. Staminate catkins sessile or nearly so, their scales with a short light-colored tip which bears a tuft of long hairs very much exceeding it; buds narrower and decidedly acute; twigs never bearing the long bristle-like hairs except possibly at the nodes. In flower, the bracteoles in the staminate catkin project slightly or not at all beyond the lateral margins of the scale, which latter is usually more arched.— K. M. WIEGAND, Wellesley College.

VIOLA BRITTONIANA AT CONCORD, MASSACHUSETTS.— Some of my botanical friends inform me that the violet with deeply-incised leaves now known as *Viola Brittoniana* Pollard is considered of rather sparse and local distribution in eastern Massachusetts. In 1839 the late Edward Tuckerman, then a student in the Harvard Law School, found the plant (then considered a phase of *V. palmata*) "abundant, in Concord in this county. The ground was drier where it grew than the plant [*V. palmata*] commonly affects"; and a sheet of his material is preserved at the Gray Herbarium. Mr. Walter Deane has specimens of it which he collected in 1887 on the banks of Concord River not far from the Old Manse, where he was staying at the time. I do not remember to have noticed it in that particular locality, but I have found it commonly enough in a number of places two or three miles further down the river and really abundantly in the meadows lying just to the eastward of Ball's Hill, where there must be hundreds if not thousands of plants for they are spread over a considerable area, growing for the most part only a yard or two apart and sometimes within less than a foot of one another. Here, as elsewhere, they shun

the wetter portions of the meadows and occur most plentifully along slightly elevated ridges or benches of comparatively dry land bordering closely on the river. On these the grass is regularly cut in summer or early autumn; when the violets bloom the following spring it has not grown sufficiently to screen them wholly from one's view and for a brief season their flowers give a pleasing tinge of bluish purple to spots where they most abound. I am informed that others have found the species in some abundance in similar habitats along the Concord River in Carlisle and Bedford.— William Brewster, Cambridge, Massachusetts.

Lathyrus palustris, var. pilosus (Cham.) Ledeb. in Massachusetts.— During the past summer *Lathyrus palustris*, var. *pilosus* (Cham.) Ledeb. was found by the writer growing in some abundance along the roadside at Woodbury's, Ipswich Sand Dunes. It has previously been reported by White (Bull. Torr. Bot. Club *21*, 448, 1894) from Lubec, Maine (*Oakes*), as *L. myrtifolius*, var. *macranthus*; and has been collected by Fernald at Cutler, Maine. So far as the writer is aware these are the only previously known stations for this variety in New England.— K. M. Wiegand, Wellesley College.

Vol. 11, no. 124, including pages 65 to 84 and plate 79, was issued 13 April, 1909.

Gray's New Manual of Botany — 7th Edition

An illustrated flora of the Northern United States and Canada east of the 96th meridian. By ASA GRAY, LL.D., late Professor of Natural History, Harvard University. Thoroughly revised and largely rewritten by BENJAMIN LINCOLN ROBINSON, Ph.D., Asa Gray Professor of Systematic Botany, and MERRITT LYNDON FERNALD, S.B., Assistant Professor of Botany, Harvard University, assisted by specialists in certain groups. With more than nine hundred text figures.

Regular Edition. Cloth, illustrated, 8vo, 928 pages. Price, $2.50.

Tourist's Edition. Limp leather, 5×7½ inches. Price, $3.00.

AMERICAN botanists, who have been impatiently awaiting the revision of this indispensable work, will be delighted to know that a seventh, completely revised, and copiously illustrated edition, is now ready. The revision has entailed years of work by skilled specialists. No effort or expense has been spared to attain the highest degree of clearness, terseness, and accuracy. The plant families have been rearranged in a manner to show the latest view of their affinities, and hundreds of species have been added to the flora. The nomenclature has been brought into thorough accord with the important international rules recently established — a feature of great significance. Indeed, the Manual is the only work of its scope which in the matter of nomenclature is free from provincialism and rests upon a cosmopolitan basis of international agreement. Nearly a thousand figures have been added, and scores of brief and lucid keys have been introduced in a manner which greatly simplifies the problem of plant identification. The work has been extended to include Ontario, Quebec, and the maritime provinces of Canada.

AMERICAN BOOK COMPANY

New York Cincinnati Chicago Boston

HOME GROWN LILIES.

Fresh from Beds. Wild Flowers, Hardy plants of all kinds.
Send for catalogue.

F. H. HORSFORD, Charlotte, Vt.

BIRDS OF MAINE

is the latest and most complete work on northeastern bird life. It is an illustrated work of 693 pages and contains descriptions of the plumage and full accounts of the nests, eggs, habits and general home life of 327 species of birds. As a book for the amateur or for the scientific student of bird life in northeastern America it is unexcelled. Sent prepaid on receipt of price, $3.50. Address all orders to

ORA WILLIS KNIGHT, 84 Forest Avenue, Bangor, Maine.

CAMBRIDGE BOTANICAL SUPPLY COMPANY,

WAVERLEY, MASS.

BOTANICAL SUPPLIES OF EVERY DESCRIPTION.

Samples of Driers and Mounting Papers sent on request.
ASK FOR NEW CATALOG, NO. 91.

STANDARD MATERIAL. IMMEDIATE SHIPMENT.
Physiological Instruments. How do Plants Work?

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB.

Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS
MERRITT LYNDON FERNALD } Associate Editors.
HOLLIS WEBSTER

WILLIAM PENN RICH
EDWARD LOTHROP RAND } Publication Committee.

Vol. 11. June, 1909. No. 126.

CONTENTS:

Variations of Arenaria peploides. *M. L. Fernald* 109
Another hybrid Violet. *E. Brainerd* 115
Bryophytes of the Mt. Greylock Region,— IV. *A. L. Andrews* 116
On Oxalis stricta var. viridiflora. *H. H. Bartlett* 118
A Variety of Proserpinaca palustris. *M. L. Fernald* . . . 120
Two introduced Plants. *C. H. Knowlton* 120
An Addition to the Flora of New Jersey. *E. B. Bartram* . 121
Another Mushroom Book 121
Field Meeting of the Vermont Botanical and Bird Clubs . . 124

Boston, Mass.
1052 Exchange Building.

Providence, R. I.
Preston and Rounds Co.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price $1.00 per year ($1.25 to all foreign countries including Canada); single copies 15 cents. Volume 1, $2.00, Vol. 2, $1.50. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

B. L. ROBINSON, 3 Clement Circle, Cambridge, Mass.

Subscriptions, advertisements, and business communications to

W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

Single copies may be had from

E. L. RAND, Corresponding Sec'y N. E. Botanical Club,

1052 Exchange Building, Boston, Mass.

Entered at Boston, Mass., Post office as Second Class Mail Matter

---

SYNOPTICAL FLORA OF NORTH AMERICA, by A. GRAY and others. Vol. I. Fascicles 1 and 2. A critical treatment of forty-five families of polypetalæ (*Ranunculaceæ to Polygalaceæ*) 1895-1897. $5.20.—GRAY HERBARIUM of Harvard University, Cambridge, Mass.

KEY TO NEW ENGLAND TREES, Wild and Commonly Cultivated, based primarily upon leaf characters, by J. FRANKLIN COLLINS and HOWARD W. PRESTON. Price 40c. net. PRESTON & ROUNDS CO., Providence, R. I.

WASHINGTON'S FLORA.

A few complete sets and some incomplete ones of my Fascicle XII of Washington Plants are still on hand; also specimens of many species distributed in earlier fascicles. Send for lists.

W. N. SUKSDORF - - Bingen, Wash., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collectors' memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3-4 in. *1 year $4.00, 6 months $2.50.*

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 11. June, 1909. No. 126.

THE VARIATIONS OF ARENARIA PEPLOIDES IN AMERICA.

M. L. Fernald.

It has long seemed to the writer that the fleshy tufted plant of the sea-sands of New England and eastern Canada, which passes with us as *Arenaria peploides* L. or, with those who prefer to separate it from *Arenaria*, as *Ammodenia peploides* (L.) Rupr., is doubtfully identical with the slender plant of northern Europe and our arctic and sub-arctic regions. In habit our plant differs strikingly from the European type but, owing to the infrequency of its fruiting upon the New England coast, the writer has been forced until the present to leave its status unsettled. Recently, however, he has collected fruiting material on beaches of the lower St. Lawrence, and this with fully mature fruit sent by Miss Mary Robinson from Nantucket shows that not only in habit, foliage, and inflorescence, but in the size of the fruit and the surface of the seed, is our plant readily distinguished from typical *A. peploides* of Linnaeus.

In fact, if compared only with the typical European *Arenaria peploides*, our plant would be called with slight hesitation a perfectly distinct endemic species; but a study of *A. peploides* from various parts of the northern hemisphere leads to the conviction that it is best treated as a circumpolar species with a number of more or less defined tendencies or varieties in different regions. In North America there are five pronounced variations of which the New England and eastern Canadian plant is the most extreme.

The Linnean *Arenaria peploides*[1] of northern Europe is a small plant with comparatively slender, though fleshy, procumbent, rather

[1] L. Sp. Pl. 423 (1753).

freely branching, densely tufted stems which (in the dried plants) are 1.5–3 mm. in diameter and rising only 0.5–2 dm. above the sand. Its leaves are somewhat fleshy, ovate to elliptic, 0.5–2 cm. long; its flowers, to quote the description of Bentham and Hooker, are "few, on short pedicels, in small, leafy, terminal cymes, usually more or less unisexual" [1]; its globose thick-walled capsules, "about the size of a small pea," [2] are by measurement 6–8 mm. in diameter, containing few rather lustrous large dark brown seeds. This small plant with definite short cymes occurs in America, so far as known to the writer, only upon the coast of Labrador and in arctic Alaska.

On the shores of Behring Sea and the North Pacific from the Aleutian Islands south to Japan occurs an extremely large plant, coarser in all its parts than the true *Arenaria peploides*, but with well developed cymes as in the typical form. This large North Pacific plant seems to be, however, not a mere luxuriant development of *A. peploides*, but a well defined variety, for the walls of its capsules are comparatively thin and so translucent (in the dried specimens) as to show clearly the forms of the very lustrous light reddish-brown seeds. This large variety was also collected by the late Rev. A. C. Waghorne on the west coast of Newfoundland; and, in view of the known affinity of the flora of western Newfoundland and Gaspé with that of the North Pacific region, may be looked for elsewhere about the Gulf of St. Lawrence.

The common plant from north of the Straits of Belle Isle, on the coast of Labrador, seems in every way identical with the Greenland *Arenaria peploides*, var. *diffusa* Hornem.,[3] which is depressed, with even more slender branches than in the European type, these often purple-tinged and very slightly if at all thickened; and which has only 1–3 flowers in the upper axils instead of definite cymes. The var. *diffusa* of Greenland and Labrador in its matted habit and slender stems superficially resembles luxuriant plants of *Stellaria humifusa* rather than the coarse rigid plant with which we are familiar farther south on the Atlantic coast or a somewhat less extreme variation which occurs on the Pacific coast from the Aleutian Islands to Washington and Japan.

This common plant of the Pacific coast from southern Alaska

[1] B & H. Brit. Fl. ed. 7, 68 (1900).
[2] Syme, Engl. Bot. ii, 107 (1873).
[3] Hornem. Oec. Pl. ed. 3, 501 (1821).

southward was distinguished by Hooker as *Arenaria peploides, β. major*[1] and it was later described by Torrey and Gray as a distinct species, *Honckenya oblongifolia.*[2] Hooker's description is very brief but the citation of the type from De Fuca's Straits as well as a fragment of the material preserved in the Gray Herbarium indicates that his plant is identical with that described by Torrey and Gray. *A. peploides*, var. *major* is clearly separable from true *A. peploides* with ovate leaves and well developed cymes by its thicker, more fleshy stems (in dried plants varying from 2–4 mm. in diameter), its more elongate branches with few axillary slender-pediceled flowers, its larger leaves, and the narrower acuminate sepals.

The common plant of the Atlantic coast from the mouth of the St. Lawrence southward is even more fleshy than the Pacific coast var. *major*, the elongate, erect or strongly ascending, rigid branches ("large as a goose quill" according to William Oakes[3]) measuring in dried specimens 2.5–6 mm. in thickness. Its leaves are oblong or oblong-ovate, very thick and coriaceous, and scarcely narrowed at base. Its few flowers are borne in the upper axils on very short thick pedicels; its ovate sepals are obtuse or at most subacute; the thick-walled capsules 8–12 mm. in diameter; and the mature seeds dark brown, distinctly papillose and scarcely lustrous. Superficially this rigid thick-stemmed plant of the Atlantic seaboard suggests the Pacific coast *Arenaria peploides*, var. *major*, but that well distinguished plant has the thinner larger leaves narrowed at base, the flowers slender-pediceled, and the narrowly ovate or lanceolate sepals acuminate.

At first thought one is surprised that those keen-eyed observers of our flora, Michaux and Pursh, did not point out the striking dissimilarity of our plant and the true *Arenaria peploides* with which they must have had some experience in Europe; but apparently neither of them had much familiarity with the coastal sands of the north-eastern states and Canada. Michaux does not mention *A. peploides*, and Pursh knew it as an American plant only from a Labrador specimen in the Banksian herbarium.[4] In 1818 Nuttall listed *A. peploides* in his Genera,[5] as growing "on the sea-coast," and took up separately

[1] Fl. Bor.-Am. i. 102 (1830).
[2] T. & G. Fl. i. 176 (1838).
[3] Oakes's manuscript notes in Gray Herbarium.
[4] Pursh, Fl. i. 317 (1814).
[5] Nutt. Gen. i. 290 (1818).

the problematical *Holosteum succulentum* of Linnaeus,[1] saying of it "Probably nothing more than *Arenaria peploides*, which grows on the sea-coast of New-Jersey, as this *Holosteum* cannot now be found." In 1824, Jacob Bigelow published a good account of our plant (as *A. peploides*) from sandy beaches "particularly at Plumb island, near Newburyport where it forms large crowded tufts resembling islets;"[3] and in the same year Torrey[4] described it clearly from New Jersey, Long Island, and Massachusetts, likewise as *A. peploides*. In 1836 Rafinesque, treating this section of *Arenaria* as a genus, *Adenarium*, considered it as having two species:

"1. *A.* [*denarium*] *peploides*, Raf. *Arenaria*, do. L. Suffruticose, leaves fleshy ovate acute subserrate.— Europe, Seashore, seen dry.

"2. *A. Maritimum* Raf. *Holosteum succulentum* L. *Arenaria peploides* of Amer. botanists. Herbaceous dichotome, leaves fleshy ovate obtuse entire petals obovate — Atlantic shores of N. America from New England to New Jersey, in sand, flowers white, vernal, terminal and in forks. Seen alive. Nuttal refers to this, the American *Holosteum* of L. who must have mistaken the glands for trifid petals, but he says leaves elliptic. Figures Autikon. Ic. n. sp."[5]

There is no doubt that Rafinesque had our common representative of *Arenaria peploides*; but his reference to it (following Nuttall) of *Holosteum succulentum* L. was unfortunate, for there is strong evidence that the latter plant, which was based by Linnaeus on Colden's description of *Alsine foliis ellipticis succulentis*, could not have been an *Arenaria*.[6] So far as a search of literature has shown the disposition of our coastal fleshy *Arenaria* by Nuttall, Bigelow, and Torrey has since passed unchallenged, except by Rafinesque. That it is clearly different from the little tufted plant of Europe with its small cyme of flowers, small capsule, and more lustrous seed, there can be no question; but in view of its close similarity on the one hand to the more northern *A. peploides*, var. *diffusa*, on the other to the Pacific coast var. *major*, it is evidently to be considered a pronounced geographic tendency or

[1] L. Sp. i. 88 (1753).

[2] Nutt. Gen. i. 89 (1818).

[3] Bigel. Fl. Bost. ed. 2, 181 (1824).

[4] Torr. Fl. N. and Mid. U. S. 453 (1824).

[5] Raf. New Fl. pt. 1, 62 (1836).

[6] In Colden's original description (Pl. Cold. Noveb. 86, no. 9) the "*petala* quinque, calyce minora, ad unguem bifida" indicates, as Torrey has already suggested (Fl. N. and Mid. U. S. 159) "that this long lost species is nothing more than STELLARIA *media*, in which the flowers are frequently triandrous, and the leaves a little fleshy."

variety of a broadly distributed polar type rather than a distinct species. But since the name *maritima* has twice been used for species in the genus *Arenaria* and as a varietal designation would be quite meaningless for a local variation of a uniformly maritime [1] species, a more appropriate name is proposed for the plant now first treated as a variety.

The American variations of *Arenaria peploides* may be briefly defined as follows.

* Flowers few to many in terminal leafy cymes.

Arenaria peploides L. Rooting and usually much branched deep in the sand; the leafy branches of the season procumbent, 0.5–2 dm. high, usually much forked, somewhat fleshy, 1.5–3 mm. in diameter (when dry): leaves ovate or elliptic, somewhat fleshy, 0.5–2 cm. long: flowers few, on short pedicels, in small terminal leafy cymes, usually more or less unisexual; sepals 4–5 mm. long, ovate, obtuse or acutish: capsule globose, thick-walled, 6–8 mm. in diameter: seeds compressed-pyriform, 3–4 mm. long, dark brown, somewhat lustrous and rugulose.— Sp. Pl. 423 (1753); Eng. Bot. iii. t. 189 (1794); Pursh, Fl. i. 317 (1814); and subsequent Am. auth. in small part only. *Alsine peploides* Crantz, Inst. ii. 406 (1766). *Arenaria portulacea* Lam. Fl. Fr. iii. 38 (1778). *Honkenya peploides* Ehrh. Beitr. ii. 181 (1788); Reichenb. Ic. Fl. Germ. v. t. 213, fig. 3670 — as *Honckenya* (1841). *Arenaria littoralis* Salisb. Prodr. 299 (1796). *Halianthus peploides* Fries, Fl. Hall. 75 (1817). *Adenarium marina* S. F. Gray, Nat. Arr. Brit. Pl. ii. 545 (1821). *Adenarium peploides* Raf. New Fl. pt. 1, 62 (1836). *Merckia peploides* G. Don. Gen. Syst. i. 441 (1831). *Honkeneja peploides, a. latifolia* Fenzl in Ledeb. Fl. Ross. i. 358 (1842). *Ammadenia peploides* Rupr. in Beitr. Pfl. Russ. Reich. ii. 25 (1845).— Coastal sands of boreal regions. In America known only from Labrador and arctic Alaska.

Var. **maxima**, n. var., ramis subsimplicibus vel aliquid furcatis 1.2–3.5 dm. altis paulo succulentibus 2–4 mm. crassis; foliis late lanceolatis vel elliptico-ovatis basin versus angustatis aliquid carnosis, eis mediae partis 2–4.5 cm. longis 1–2 cm. latis; cymis multifloris; sepalis ovatis vel ovato-lanceolatis 5–7 mm. longis; capsula 7–9 mm. diametro tenui (siccatate translucenti); seminibus levibus et lucidis pallide rufo-brunneis.

Branches subsimple or slightly forked, 1.2–3.5 dm. high, slightly succulent, 2–4 mm. thick: leaves broadly lanceolate to elliptic-ovate, narrowed at base, slightly fleshy, the middle ones 2–4.5 cm. long, 1–2 cm. broad: cymes several-flowered: sepals ovate to ovate-lan-

[1] The reference in the Synoptical Flora to an imperfect specimen from Yellowstone Lake as perhaps belonging to *Arenaria peploides* was based on an immature plant which does not satisfactorily match any known form of this species.

ceolate, 5–7 mm. long: capsule 7–9 mm. in diameter, thin-walled (translucent in dried specimens): seeds smooth and lustrous, light reddish-brown.— Aleutian Islands, tide-margin at Nazan Bay, Atka, July 26, 1907 (*E. C. Van Dyke*, no. 237); Behring Island, July 15, 1891 (*N. Grebnitsky*, Herb. Geol. Surv. Can.): Kamtchatka, Ochotsk Sea, 1853–56 (*J. Small*, Herb. U. S. N. Pacific Exped.): Japan, near Hokodate, Hokkaido (*Albrecht*, 1861); Zenibako, June, 1883, Oshamambo, July, 1883 (*S. Takenobu*): Newfoundland seashore, Wild Cove, July 10, 1896 (*A. C. Waghorne*).

* * Flowers few, terminal or axillary but not in distinct cymes.

Var. diffusa Hornem. Dwarf, matted: the flaccid depressed branches scarcely fleshy, 3–20 cm. long, 1–2 mm. thick, often purple-tinged: leaves ovate to elliptic, narrowed at base, slightly fleshy, 0.5–1.5 cm. long: flowers 1–3, on short slender pedicels: sepals lance-ovate, acute, 5–7 mm. long: capsules as in the typical form.— Oec. Pl. ed. 3, 501 (1821). *Halianthus peploides*, var. *diffusa* Lange, Conspect. Fl. Groenl. pt. 1, 26 (1880). *Arenaria diffusa* Wormskj. ex Lange, Consp. Fl. Groenl. pt. 2, 243 (1887). *Honckenya peploides, α diffusa* Kruuse, Med. om Grönl. xxx. 229 (1906).— Greenland and arctic America, south to the Straits of Belle Isle, Labrador.

Var. major Hook. Branches fleshy, subsimple to freely forked, 1–4 dm. long, 2–4 mm. thick: leaves elliptic or oblong, somewhat fleshy, narrowed at base, the middle ones 2–3.5 cm. long: flowers few, axillary, on slender often elongate (6–25 mm. long) pedicels: sepals lanceolate or lance-ovate, acute, 6–8 mm. long: capsule 9–12 mm. in diameter: seeds lustrous.— Fl. Bor.-Am. i. 102 (1830). *Honckenya oblongifolia* Torr. & Gray, Fl. i. 176 (1838). *Arenaria sitchensis* Dietr. Syn. Pl. ii. 1565 (1840). *Honkeneja peploides, β. oblongifolia* Fenzl in Ledeb. Fl. Ross. i. 358 (1842). *Halianthus peploides*, var. *oblongifolia* Hartm. Skand. Fl. ed. 11, 244 (1879). *Ammodenia major* Heller, Cat. N. Am. Pl. 4 (1898). *Alsine peploides*, subsp. *oblongifolia* Gürke in Richter, Pl. Eu. ii. 265 (1899). *Ammodenia peploides major* Piper, Contrib. U. S. Nat. Herb. xi. 260 (1906).— Pacific coast, from the Aleutian Islands and Kamtchatka south to Washington and Japan; said by Hartman to occur in Scandinavia.

Var. **robusta**, n. nom. Branches erect or ascending, very fleshy, simple or sparingly forked, 1.5–5 dm. high, 2.5–6 mm. thick: leaves oblong or oblong-ovate, scarcely narrowed at base, very thick and coriaceous, the middle ones 1–3 cm. long: flowers few, axillary or from the upper forks, on short (3–7 mm. long) thick pedicels: sepals ovate, obtuse or subacute: capsule thick-walled, 8–12 mm. in diameter: seeds dark brown, distinctly papillose, only slightly lustrous.— *A. peploides* Nutt. Gen. i. 290 (1818); Bigel. Fl. Bost. ed. 2, 181 (1824); Torr. Fl. N. and Mid. U. S. 453 (1824); and most subsequent Am. auth. *Holosteum succulentum* Nutt. Gen. i. 89 (1818)

not L. Sp. Pl. i. 88 (1753). *Adenarium maritimum* Raf. New Fl. pt. 1, 62 (1836) except as to synonym *Holosteum succulentum* L. *Honkenya peploides* Gray, Gen. ii. 31, t. 110 (1849).— Atlantic coast from Saguenay Co., Quebec to New Jersey; and reported southward to Virginia.

Gray Herbarium.

ANOTHER HYBRID BETWEEN A WHITE AND A BLUE VIOLET.

Ezra Brainerd.

Viola cucullata × primulifolia. (*V. lavandulacea* Bicknell, Torreya, iv. 130.) This hybrid I discussed briefly in Rhodora, viii. 52, remarking on its evident relationship to *V. cucullata*, and querying if the other parent might not be such a form of *V. emarginata* as I had in cultivation from Washington, D. C., with strongly decurrent base and leaf-outline of *V. primulifolia*. Soon afterward Mr. Bicknell in conversation stated that he had thought the doubtful parent might be the real white-flowered *V. primulifolia*. I replied there was no precedent for so remote a cross in Viola; it must be considered quite improbable. But Mr. Forbes's recent discovery of *V. Brittoniana* × *lanceolata* [1] throws a new light on the problem. A critical study of his plants leaves one in no doubt as to the correctness of his conclusions; the presence in them of stolons can be accounted for only on the hypothesis of a sexual union between a purple-flowered and a common white violet. The precedent being established, we are prepared to weigh the evidence sustaining Mr. Bicknell's opinion as to the parentage of his *V. lavandulacea*.

The marks of *V. cucullata* are indisputable, especially the long-auricled slender cleistogamous flowers, the short glabrous spurred petal, the knobbed beard on the lateral petals, and the finally acuminate leaves. The marks of *V. primulifolia* are also conspicuous, namely, — the truncate and decurrent base of the leaf, its obscurely crenulate margin, its numerous nearly parallel veins diverging from the midrib,

[1] Rhodora, xi. 14, Jan. 1909.

the narrowed base of the petals, and the sharply defined deep purple lines of the three lower petals. This last inheritance from *V. primulifolia* is found, however, only in the plants from the "type station," Woodmere, and not in those from Rosedale; and, furthermore, the *cucullata* inheritance of acuminate leaves is lacking in the Rosedale plants. But this is not an uncommon experience; the several hybrid plants from the same parent species often inherit diversely the opposed parental characters.

In the Bicknell hybrid "the pale-lilac to lavender-blue" of the flowers indicates a 'blending' of the two colors of the parent flowers; while in the Forbes hybrid the purple color of *V. Brittoniana* seems to be 'dominant' over the white of *V. lanceolata*. In leaf-outline also *V. lavandulacea* is an evident compromise between the two parents. The absolute sterility of the hybrid precludes the culture of offspring, and the evidence that might come from fruit or seeds.

In fact, the living plants themselves have apparently disappeared. Mr. Bicknell found them in two stations two or three miles apart; but both stations have been much disturbed, and he was unable last summer to find further specimens. A vigorous plant was to be seen in the Bronx Park Garden in 1905; a root of this grew well in Middlebury for two years; but in both gardens the plants have since died. The hybrid will perhaps be rediscovered in moist meadows along the coast; and if so, it may be readily multiplied by division and kept alive indefinitely.

Middlebury, Vermont.

BRYOPHYTES OF THE MT. GREYLOCK REGION,—IV.[1]

A. Le Roy Andrews.

The species listed below are, except for a little material left unidentified from previous collections, the result of two trips to the mountain-summit, one in the late summer of 1904, the other on October first, 1908. Both trips were by way of the Hopper, following different branches of the Hopper Brook up to their sources near the summit.

[1] For previous notes see Rhodora IV, 29 ff., 238 ff., VI, 72 ff.

Where the fall of such brooks is greatest, in this case not far below their source, one may depend upon finding certain species of bryophytes not likely to be met with elsewhere on the mountain surface. The species not listed before are:

Musci.

Andreaea petrophila Ehrh. Covering a boulder in brook-bed, higher altitude. I have been unable to demonstrate the occurrence of this genus elsewhere on the mountain.

Brachythecium rutabulum (L.) B. & S. Wet bank by brook, lower altitude in Hopper.

Didymodon rigidulus Hedw. (*Barbula rigidula* Mitten). On rocks in Hopper. This species appears to be very uncommon in the eastern United States and I was for that reason inclined to regard my specimens as *Barbula gracilis* (Schleich.) Schwaegr., which is not dissimilar, and according to Dixon [1] may show similar brood-bodies in the axils of the upper leaves. Dr. G. N. Best, to whom I sent a specimen, calls my attention to the fact that the leaf-costa is not excurrent in the upper leaves as in *B. gracilis* and names it as above.

Fissidens minutulus Sulliv. On rocks (schist) of brook-beds, higher altitudes.

Homalia Jamesii Schimp. In crevices of rocks by brook-beds, higher altitude.

Hypnum montanum Wils. Rock of brook-bed, higher altitude. Fruited. Dr. Best kindly confirmed my identification of this uncommon and beautiful moss.

Hypnum stellatum Schreb. In wet place at base of mountain in Hopper.

Leskea nervosa (Schwaegr.) Myrin. On stump by carriage-road, higher altitude.

Mnium spinulosum B. & S. On decaying logs at middle altitude. Capsules not aggregated.

Hepaticae.

Cephalozia bicuspidata (L.) Dumort. From decaying log by brook higher altitude.

[1] Student's Handbook of British Mosses [2] p. 217.

Diplophylleia taxifolia (Wahl.) Trevis. On rock, higher altitude. This species is not common on Mt. Greylock or in the vicinity.

Harpanthus scutatus (Web. f. & Mohr) Spruce. On rotten log by brook, higher altitude.

Lejeunea cavifolia (Ehrh.) Lindb. Rocks by brook, higher altitude. Uncommon on Mt. Greylock.

Lophozia marchica (Nees) Steph. Wet bank by carriage-road near summit.

Nardia hyalina (Lyell) Carringt. Rocks in brook-bed. Dr. Evans kindly named the specimen.

Riccardia sinuata (Dicks.) Trevis. Wet rocks by brook, higher altitude.

Sphenolobus exsectus (Schmid.) Steph. Rocks of brook bed, higher altitude.

Sphenolobus Michauxii (Web. f. & Mohr) Steph. Decaying log by brook, higher altitude.

ITHACA, NEW YORK.

NOTE ON OXALIS STRICTA VAR. VIRIDIFLORA.

HARLEY HARRIS BARTLETT.

Mr. Henri Hus has described [1] a green-petaled variety of *Oxalis stricta* from the vicinity of St. Louis. During the summer of 1907 this variety was found, in plenty, growing among piles of dead brush at the edge of a pine barren near Thomson, Georgia. The effect of the habitat was to make the plants long and spindling, but otherwise they could have been distinguished from the typical form of neighboring fields only by floral characters.

The petals of *Oxalis stricta* var. *viridiflora* are light green in color, obcordate, much broader than those of the typical form, and of somewhat firmer texture. They do not close after having once opened, and remain at the base of the developing fruit for several days before wilting. In the typical form the petals open in the morning and close toward mid-day. They wilt while closed, and are often borne up as

[1] Report Mo. Bot. Gard. xviii. (1907) 99.

a cap on the tip of the lengthening fruit. At the type station of *Oxalis stricta* var. *viridiflora* Mr. Hus found only a few individuals. The occurrence of the plant in greater abundance at a distant locality strongly confirms its worth as a systematic variety. Although it has doubtless had an independent origin at different places, its characters are definite and show no greater range of individual variation than do those of typical *Oxalis stricta*.

The green petals resemble sepals in the presence of chlorophyll in the sub-epidermal tissue and in the increase in number of stomata and hairs. They differ not only from sepals but also from typical yellow petals in the shape of the epidermal cells, which are prevailingly isodiametric instead of narrowly oblong. The breadth of the petals may be correlated with this character of the epidermal cells. Results of hybridization experiments with typical *Oxalis stricta* and var. *viridiflora* will be looked forward to with interest, since it is difficult to see, if it be true, as Mr. Hus believes, that var. *viridiflora* is a variation differing in only one essential character from the parent species, just how the modified shape of the epidermal cells can be interpreted as a consequence of the presence of chlorophyll, or *vice versa*. It is not as though the variation were true sepalody, for in that case the development of two instead of one whorl of sepals might be a unit character, which would be exclusive with regard to the development of petals.

According to Dr. Small's treatment of the species of *Xanthoxalis*,[1] certain species are classed into two groups, depending upon whether the longer filaments are glabrous or pubescent. *Oxalis stricta* falls in the group with glabrous filaments. Although this character does not hold perfectly in the material from Thomson, there is a sufficient difference in degree of pubescence so that a species like *Oxalis filipes*, which belongs to the group with pubescent filaments, can be very readily distinguished from *Oxalis stricta*. In var. *viridiflora*, however, the filaments are fully as pubescent as those of *Oxalis filipes*. If there should be found variations of other species of *Oxalis* parallel to *Oxalis stricta* var. *viridiflora*, this fact ought to be allowed for if the attempt is made to place them by means of Small's key.

Cambridge, Massachusetts.

[1] N. Am. Fl. xxvi. (1907) 50.

An inland Variety of Proserpinaca palustris.— *Proserpinaca palustris* L. as it occurs in the coastal districts of eastern America has the fruit acutely angled and with three essentially flat faces. In the interior of the continent, however, where typical *P. palustris* is at least local, there occurs a plant which is so like it in foliage-character that it has passed without question as good *P. palustris*, but which in its extreme development, as shown by plants from the Great Lake region and Missouri, has the fruits rounded and plump, with scarcely defined angles. The fruit is also slightly smaller than in the best-developed *P. palustris*, but comparison shows several of the eastern specimens in which the fruit is scarcely larger. Other specimens from the Great Lakes have the fruit definitely though not very sharply angled so that, although in its extreme development the plump-fruited plant appears quite distinct, it seems more properly treated as an inland variety rather than a species, and it may be designated

Proserpinaca palustris L., var. **amblyogona**, n. var., fructu subgloboso vel ellipsoideo 3.5–4.5 mm. longo 2.5–3.5 mm. crasso, angulis obtusis vel rotundatis.— Ontario, shore of Georgian Bay, Lake Huron, July 31, 1871 (*J. Macoun*): Indiana, wet ditch, Roby, July 18, 1906 — type (*O. E. Lansing*, no. 2569): Missouri, swamps, Butler County, July 27, 1892 (*H. Eggert*), October 15, 1905 (*B. F. Bush*, no. 3700).— M. L. Fernald, Gray Herbarium.

Two Introduced Plants.— Early last summer Mr. W. P. Rich and I, while exploring the made land at South Boston, near the water front, came across large quantities of a fleshy annual. Its general appearance was that of young *Suaeda*, and some of it was actually growing under halophytic conditions. About the middle of September I secured specimens in fruit, not fully matured. When I compared it with the true Suaedas it seemed very different, nor did it agree with any of the other genera of *Chenopodiaceae* described in the Manuals.

Dr. B. L. Robinson of the Gray Herbarium has identified it for me as *Bassia hirsuta* (L.) Aschers. Its synonymy shows that at one time or another it has been placed in several different genera of the family. It is easily distinguished from *Suaeda* by its pubescence, and its ovoid axillary fruit. It is especially interesting to find a European plant adapting itself so readily to halophytic conditions in the New World. So far as I know, this is its first appearance here.

In Rhodora XI, 83. 1909, Prof. K. M. Wiegand reports *Bromus inermis* Leys. from Needham, Massachusetts, and also from Ithaca, New York. I collected some specimens of this introduced grass from a small roadside station near the golf links, at Hyannisport, July 15, 1905.— C. H. Knowlton, Boston.

An interesting addition to the Flora of New Jersey. – Along the eastern shore of Barnegat Bay south of Seaside Park, Ocean Co., New Jersey, the usual mud flats are not much in evidence and vegetation hugs the tide line very closely.

Associated with such characteristic plants as *Chenopodium album* L., *Atriplex patula* L., var. *hastata* Gray, *Polygonum exsertum* Small, *Cyperus esculentus* L. and *Salsola Kali* L. the writer last fall found a plant having some of the characters of a *Suaeda* but with apparent differences that were puzzling. Through the courtesy of Prof. M. L. Fernald the plant has been identified with a common European species, *Bassia hirsuta* (L.) Aschers.

It seems to be restricted to a narrow belt along the Bay shore and in the late summer and fall assumes a spreading and very much branched habit. In this locality the fruit is not ripe until the latter part of September when the plants are more or less covered with a mat of *Zostera marina* L. cast up by the combined action of wind and tide.— Edwin B. Bartram, Wayne, Pennsylvania.

Another Mushroom Book.— Mr. M. E. Hard, a school superintendent of the middle west, has published an illustrated book on mushrooms,[1] the purchase of which is now being urged upon the public of New England. As the work comes among us with much heralding and insistent claim to merit, some notice of its probable value and serviceableness to amateurs of mushrooms is justifiable in this journal. It may be said at once that as a popular book it will prove helpful, first because it contains a large number of descriptions convenient to have between the covers of one book, and second because

[1] The Mushroom, Edible and Otherwise— by M. E. Hard, M. A., Superintendent of Public Instruction, Kirkwood, Missouri. The Mushroom Publishing Company, Columbus, Ohio, 1908. Quarto, 609 pages, 505 figures.

it presents an abundance (505) of photographs, nearly all life size, which present, at first sight, a good appearance. When this has been said there is little more to say in commendation; yet it may be added that the publishers have done their part well, for the paper, and presswork leave little to be desired. The book appears fairly compendious. The inquisitive mushroom hunter, impatient to tag his finds, has here a larger number of names to choose from than in other popular works (barring McIlvaine's, perhaps), and will probably succeed to his satisfaction in selecting a label two times out of three for the particular toadstool in hand. He will not be heard to say quite so often: "I can't find it in the book." Whether his toadstool and his label will really belong together is quite another matter, which cannot greatly concern him, for in this pursuit ignorance (except of fatally poisonous sorts) is truly bliss, and greater knowledge — to be avoided by complacent self-respect — brings only greater discontent.

Perhaps it would be wrong to say that complacency is a characteristic of the book, for the impression conveyed at the opening by the full-page portrait of the author (somewhat reduced from life — the work is only a small quarto) is tempered by a deprecatory introduction by the late W. A. Kellerman, and by a modest preface. From the introduction we learn, with a sense of the fitness of the verb, that the author "has meddled for years with the various kinds" of mushrooms "which are edible and otherwise," and that the resultant inevitable desire to publish is only of recent growth, fostered, we infer, by too kind and too laudatory friends; in the preface and in the first chapter, on "Why Study Mushrooms," we are told from what simple, natural beginnings the impulse grew. Early botanical studies under Dr. Nelson, a deep-seated love of nature, the sight of the children of recent Bohemian immigrants to Ohio gathering mushrooms with blind, unerring instinct in a new land, awakened in the author a desire which developed a hobby, and finally the unrestrainable ambition to smooth and illuminate the path of his stumbling, groping countrymen. In this he says he follows the example of certain "ministers of the gospel ....famous in the mycological world,....Rev. Lewis Schweinitz of Bethlehem, Pa.; Rev. M. J. Berkeley and Rev. John Stevenson of England. Their influence for good and helpfulness to their fellowmen will be lasting." The heart, we see, as well as the head, is enlisted in the work; shall we say also the yearning to be ranked among the world's benefactors and to fill a niche in the Hall of Fame?

If the last suggestion is true, it is a pity that the author's desire — a worthy one, all will agree — should not have found him better equipped, for we need a good book on mushrooms, such a book as no competent American authority has yet had confidence to prepare. The demand from the public is real, and growing stronger, and is no longer satisfied by a partial response to it such as we find in the Reports of the New York State Botanist, in Government Bulletins, or in Prof. Atkinson's deservedly popular book. While we wait for an American Fries or Gillet to do for the United States something better than they did for Sweden or for France, the opportunity for cheaply earned gratitude and a passing renown lies open to any one who has learned a few names, copied a few descriptions, assembled a few pictures, and found a publisher who sees that there is a market for such a compilation.

It is hardly worth while to say much in detail of Mr. Hard's performance. He has undoubtedly done his best, with much labor, earnestness, and enthusiasm. But it is not Mr. Hard's best that we want. His failure, for instance, to provide keys in the genera where species are numerous, and even to arrange those species he selects in the order of relationship, shows a fundamental lack of capacity for making a book of this kind. Thirty-seven Boleti, for example, out of the hundred or more known in the United States, are thrown together hap-hazard. As a result, *Boletus alveolatus*, B. & C., and *Boletus Frostii*, Russell, thought by some to be identical, and, at any rate, indistinguishable by an amateur, are placed 14 pages apart. *B. edulis*, Bull, is separated from its variety, *clavipes*, Pk., by three unrelated species.

His attempt to give an English name to every species, and to give the derivation of the Latin name leads to some infelicities, as "The stemmed-massed Marasmius" (*M. cohaerens*, p. 40); "Androsaceus means an unidentified sea-plant or zoophyte" (p. 138); "Marasmius is a Greek participle" (p. 136); "Galericulata, a small peaked cap" (p. 120); "Ditopoda is from two Greek words, *di-totos*, living in two places (?), and *pus* or *poda*, foot" (p. 99).

To return to the photographs, which the writer was inclined to accept with favor, it must be said that closer examination shows them in many cases to be below the standard. In saying this the reviewer feels bound to remark that his eyes were opened to the defects of the pictures by a friend who has been engaged for many years in painstaking efforts to perfect the pictorial record of our fleshy fungy, and

who consequently knows better what to look for and what to miss. A word may be said, too, in general in regard to the truth of the photographic record. Leaving out of account the loss of color, the reduction of everything to terms of black and white, we inevitably find an alteration of values, particularly, for instance, in the yellows and violets. With the best that the photographer can do, then, his *Amanita caesarea*. and some of his yellow Pholiotas are bound to be almost unrecognizably blackened, and his *Cortinarius violaceus* and other similar species have all true likeness washed out of them.

Some of Mr. Hard's photographs suffer from other causes. Too frequently, as he mentions in certain instances, his material was not in good condition, having, perhaps, been received from a distance (Nos. 63 and 173, from Boston), or having been poorly selected, (No. 112). Many suffer from poor illumination or from indistinctness. It is to be regretted that the exigencies of publication demand the reproduction of anything but the best, such as no. 142 (from Prof. Atkinson), and numbers from C. G. Lloyd. The excellence of these, and of a few of the author's own, bring up the average. But, all in all they are disappointing to the trained eye. One, at least, no. 163, is so good as to show that it does not deserve the name assigned to it, that of *Hygrophorus pratensis*.

H. W.

The annual Field Meeting of the Vermont Botanical and Bird Clubs will be held Tuesday and Wednesday, July 6 and 7, 1909, at some point on or near the shores of Lake Champlain easily accessible from Burlington. Members desiring to attend should apply to Dr. H. F. Perkins, University of Vermont, Burlington, Vermont, for the circular giving details as to the plans.

Vol. 11, no. 125, including pages 85 to 108, was issued 4 May, 1909.

Gray's New Manual of Botany — 7th Edition

An illustrated flora of the Northern United States and Canada east of the 96th meridian. By ASA GRAY, LL.D., late Professor of Natural History, Harvard University. Thoroughly revised and largely rewritten by BENJAMIN LINCOLN ROBINSON, Ph.D., Asa Gray Professor of Systematic Botany, and MERRITT LYNDON FERNALD, S.B., Assistant Professor of Botany, Harvard University, assisted by specialists in certain groups. With more than nine hundred text figures.

Regular Edition. Cloth, illustrated, 8vo, 928 pages. Price, $2.50.

Tourist's Edition. Limp leather, 5×7½ inches. Price, $3.00.

AMERICAN botanists, who have been impatiently awaiting the revision of this indispensable work, will be delighted to know that a seventh, completely revised, and copiously illustrated edition, is now ready. The revision has entailed years of work by skilled specialists. No effort or expense has been spared to attain the highest degree of clearness, terseness, and accuracy. The plant families have been rearranged in a manner to show the latest view of their affinities, and hundreds of species have been added to the flora. The nomenclature has been brought into thorough accord with the important international rules recently established — a feature of great significance. Indeed, the Manual is the only work of its scope which in the matter of nomenclature is free from provincialism and rests upon a cosmopolitan basis of international agreement. Nearly a thousand figures have been added, and scores of brief and lucid keys have been introduced in a manner which greatly simplifies the problem of plant identification. The work has been extended to include Ontario, Quebec, and the maritime provinces of Canada.

AMERICAN BOOK COMPANY

New York Cincinnati Chicago Boston

HOME GROWN LILIES.

Fresh from Beds. Wild Flowers, Hardy plants of all kinds.
Send for catalogue.

F. H. HORSFORD, Charlotte, Vt.

BIRDS OF MAINE

is the latest and most complete work on northeastern bird life. It is an illustrated work of 693 pages and contains descriptions of the plumage and full accounts of the nests, eggs, habits and general home life of 327 species of birds. As a book for the amateur or for the scientific student of bird life in northeastern America it is unexcelled. Sent prepaid on receipt of price, $3.50. Address all orders to

ORA WILLIS KNIGHT, 84 Forest Avenue, Bangor, Maine.

CAMBRIDGE BOTANICAL SUPPLY COMPANY,

WAVERLEY, MASS.

BOTANICAL SUPPLIES OF EVERY DESCRIPTION.

Samples of Driers and Mounting Papers sent on request.
ASK FOR NEW CATALOG, NO. 91.

STANDARD MATERIAL. IMMEDIATE SHIPMENT.

Physiological Instruments. How do Plants Work?

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB.

Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS
MERRITT LYNDON FERNALD } Associate Editors.
HOLLIS WEBSTER

WILLIAM PENN RICH
EDWARD LOTHROP RAND } Publication Committee.

Vol. 11. July, 1909. No. 127.

CONTENTS:

On the Flora of lower Cape Cod. *F. S. Collins* . . . 125

North American Species of Barbarea. *M. L. Fernald* . . 134

Epilobium alpinum and E. Hornemanni. *A. H. Moore* . 141

A Teucrium new to Massachusetts. *E. B. Bartram* . . 148

Federation of Natural History Societies,— Field Meeting . 148

Boston, Mass.
1052 Exchange Building.

Providence, R. I.
Preston and Rounds Co.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price $1.00 per year ($1.25 to all foreign countries including Canada); single copies 15 cents. Volume 1, $2.00, Vol. 2, $1.50. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

B. L. ROBINSON, 3 Clement Circle, Cambridge, Mass.

Subscriptions, advertisements, and business communications to

W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

Single copies may be had from

E. L. RAND, Corresponding Sec'y N. E. Botanical Club,
1052 Exchange Building, Boston, Mass.

Entered at Boston, Mass., Post office as Second Class Mail Matter

SYNOPTICAL FLORA OF NORTH AMERICA, by A. GRAY and others. Vol. I. Fascicles 1 and 2. A critical treatment of forty-five families of polypetalæ (*Ranunculaceæ to Polygalaceæ*) 1895–1897. $5.20.—GRAY HERBARIUM of Harvard University, Cambridge, Mass.

KEY TO NEW ENGLAND TREES, Wild and Commonly Cultivated, based primarily upon leaf characters, by J. FRANKLIN COLLINS and HOWARD W. PRESTON. Price 40c. net. PRESTON & ROUNDS CO., Providence, R. I.

WASHINGTON'S FLORA.

A few complete sets and some incomplete ones of my Fascicle XII of Washington Plants are still on hand; also specimens of many species distributed in earlier fascicles. Send for lists.

W. N. SUKSDORF - - Bingen, Wash., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collectors' memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3–4 in. *1 year $4.00, 6 months $2.50.*

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 11. July, 1909. No. 127.

NOTES ON THE FLORA OF LOWER CAPE COD.

F. S. Collins.

During the years 1906, 1907 and 1908 I was in the town of Eastham, Massachusetts for longer or shorter periods from April to September, and while flowering plants were not the principal object of my observations, I made the attempt to record and collect specimens of all the species that I noticed. The resulting list, while not containing many notable rarities, shows curious limitations and other peculiarities, and though the full list is not worth printing, some notes may be of interest to readers of Rhodora.

In the trip from Boston to Cape Cod, a gradually increasing sandiness of the soil is noticeable, from Middleboro on; this increase is nearly uniform all the way; at Provincetown, at the extreme end, it is not so striking to the traveler, as the latter comes to a compact town, the houses with little lawns and gardens; but all the soil for these lawns and gardens was brought from more fortunate places, and over the ridge that lies back of the town is an expanse of sand as desolate as any desert in Asia. At Truro, the next town up, the desolate character is most manifest to the ordinary traveler, the sand cliffs and dunes being unrelieved by any town, only by scattered houses here and there. Eastham is about twenty miles from the tip of the Cape, and while the scenery is not so impressive as that in Truro, the conditions must be practically the same as to vegetation, and its flora may be considered as fairly representative of lower Cape Cod.[1] The town is six miles long, two to three miles wide; the eastern side is all composed of larger or smaller sand dunes, a somewhat higher bluff facing

[1] By lower Cape Cod is here meant the part beyond the elbow at Harwich; upper on the map, but lower as being farther from the mainland.

the ocean, with a narrow, sharply sloping beach of coarse, loose sand at its base. The sea is continually eating away the base of this cliff, carrying the material out to sea, and building shifting and dangerous bars off shore. The western side of the town is flatter, apparently largely salt marsh covered with sand; near the shore it is still marsh, and the water is very shallow for a long distance, not reaching a depth of 18 feet until five miles from the shore. This shore of the Cape seems to be gradually moving to the west, the increase here probably compensating for the loss on the east shore. On this side of the town there are a few small brooks, apparently on the lines of the salt water creeks of the former marsh; but in the eastern part of the town there is absolutely no drainage system; the surface is dotted over with rounded depressions of all sizes and depths, with steep slopes, which quite cut them off from each other, so that there is no connection whatever between them. What vegetable matter there is collects at the bottom of these hollows, which vary in size and depth, from a shallow depression a few yards in diameter, with the grass greener at the bottom than on the surrounding surface, to large and deep ponds. In the richer ground at the bottom of the smaller hollows, and around the swamp or pond in the larger, are to be found species that could not exist on the barren sands above. There being no connection of one such hollow with another, each has a character of its own, interesting species being often found in one such hollow but not in others near by. Collecting in this region is wearisome, as one must continually climb up from one hollow to go down into the next; and there is a curious loneliness in these hollows, nothing in sight beyond their edge, and few sounds to be heard other than the wind and the surf. The climate is, on the whole, milder than that of the vicinity of Boston, extremely low temperatures being unusual in winter, and the wind from either the ocean or the bay tempering the heat of summer. The poverty of the flora is due to soil conditions, not to climate.

The plants may be roughly classified into four groups; those of general distribution, which one sees everywhere on the sandy roads and fields; marine species, growing in places under the influence of salt water; domestic species, living in the neighborhood of houses and barns; and "specialties," species to be found only in particular, limited stations. The marine species, those of the beaches and marshes, are practically the same as in the vicinity of Boston, the conditions

being about the same; *Salicornia ambigua*,[1] however, rare near Boston, is here as common as *S. europaea* and *S. mucronata*. *Solidago sempervirens* is very luxuriant, the heads being sometimes double the size of any I have seen in Essex or Middlesex. *Ammophila arenaria* is omnipresent on the sand dunes, and around the clumps one often sees the curious arcs of circles traced by the leaves, whipped about by the wind that seems always to blow there.

The domestic species do not differ much from those of more favored localities, but some of the more delicate or exac ing ones are absent. There are balm of Gilead trees near every house, and near the older houses lilac bushes. At the place where I lived the lilac bush was as large as a small house, a dense thicket of stems below, a mass of leaves and flowers above; the catbird built its nest there, while the birds of the barnyard found it an excellent roosting place by day or night. *Leonurus Cardiaca* was about all the old barns, and *Marrubium vulgare*, equally common, seemed to take the place of catnip, which I saw nowhere. *Saponaria officinalis* and *Pastinaca sativa* were common, and *Malva rotundifolia* formed a narrow strip close to the walls of the houses and barns, seldom going far from them; *Tanacetum vulgare*, usually var. *crispum*, could often be found in places where now there was no apparent sign of human life, but in every case a search would show some old well or other indication that a home had once been there. The tansy seemed never to stray beyond the boundaries of the old yard, though the fence had gone a hundred years ago. On the slope of a hollow near my house there came out, after a rain, a carpet of little red, white and yellow stars; *Anagallis*, flowers about normal; *Mollugo*, flowers exceptionally large; *Potentilla*, flowers unusually small; so that all the flowers were nearly of a size.

The species of general distribution, those that one would notice along the road or from the train window, are comparatively few, but each represented by many individuals. The first to attract attention in spring is the beach plum, *Prunus maritima*; it is a rather dense shrub, growing by roadsides or in fields, seldom as high as a man's head; before the leaves appear it is covered with white flowers the whole length of the branches, so closely set that one can hardly touch the branch between them. In late summer and early autumn the fruit ripens, about as large as a small cherry; it is at first pale green,

[1]As the names of plants mentioned in these notes are those used in the seventh edition of Gray's Manual, I have not thought it necessary to add the authors' names.

then waxy yellow, pink, red, purplish, and finally almost black; all these shades at once in a small bush, sometimes covering it as completely as did the flowers in April or May; it is a most attractive shrub, and the fruit, prepared by some native Cape Codder, makes delicious pies and preserves. In May and June the lupine abounds, growing in dense clumps on sandy stretches; it seems even more luxuriant than in more favored stations, and the racemes range in color from nearly true blue to pinkish purple. In stations too desolate even for the lupine the Hudsonias abound, both *H. tomentosa* and *H. ericoides*. They usually grow in dense clumps, each a single plant, the branches twisted like a Japanese dwarf tree; often there is nothing but bare sand between the clumps. When the wind blows, as it almost always does in Eastham, the sand drifts and catches among the branches of the *Hudsonia*, forming a dome-shaped heap inside the clump, sometimes only the tips of the branches projecting; in such cases the plant, without enough leaf surface free to maintain its life, throws all its energies into a dense and brilliant coating of yellow flowers. The bearberry, *Arctostaphylos Uva-ursi*, is very abundant, the shining leaves carpeting large stretches of sand; the wild carrot, *Daucus Carota*, is everywhere in the fields; in summer and early autumn *Chrysopsis falcata* abounds, with its own particular shade of yellow. *Corema Conradii* is frequent and showy in spring, but not so general as the other plants just mentioned. Few species of trees occur, but the pitch pine is everywhere, forming dense forests of stunted individuals; some fifty or sixty years ago it was planted extensively in the most barren places, and one can still trace the regular rows in which it was set out. Now it is continually spreading, covering large areas that were cultivated fields fifty years ago. Black snakes are plentiful among the pines, and have the pleasing habit of hanging by the tail from a limb, looking like a broken branch until you come in contact with them. The locust, *Robinia Pseudo-Acacia* is common, evidently long ago escaped; there are some scrub oaks, but few other trees. Of cryptogams other than algae, there are few noticeable species. In moist places are often stretches of densely packed *Woodwardia virginica*; common brake grows under the pines; other ferns are not much in evidence. Trees and fences are often completely covered with a lichen of the bright yellow that one sees only near salt water; crisp Cladonias alternate with the blackberry vines in the fields, but there are no rock lichens, as there are no rocks to support them.

Fleshy fungi vary in frequency; in damp seasons there is sometimes a most abundant growth of *Amanita muscaria* and one or more species of *Boletus*, all through the pine woods; giants, all of them.

The three classes, marine, domestic and general, include only a minority of the species noted; more were found in special limited stations. There is absolutely no drainage in the eastern part of the town, and in each pond or swamp, within its own hollow, lives a flora independent of the others and with a character of its own. The water was very low in the summers of 1907 and 1908, and there was an excellent chance to study the floras of these neighboring but isolated stations. Meeting-House Pond may be taken as an example; *Castalia odorata* was plenty; at times the water was so low that the dry leaves crackled under my foot as I walked near the shore; its duplicate in miniature, *Nymphoides lacunosum*, floated in a band, a short distance from the edge. *Pontederia cordata*, *Lobelia Dortmanna* and *Eriocaulon septangulare* covered quite a zone, from where the water had been in the spring, to some distance below its summer level. Around the blue water was a broad belt of white sand, like the cornea about the iris; this was variegated by vines of flowering cranberry, and geometrical patterns made by a prostrate purple grass. *Hydrocotyle umbellata* grew where there was any shade, *Gratiola aurea* and *Xyris caroliniana* were plenty near high water line. In July, all around the pond, among the grass, was the beautiful *Sabatia dodecandra*; I did not find it at any other station in the town; as this passed away, its place was taken by *Coreopsis rosea*, and in late summer two white Eupatoriums, *E. hyssopifolium* and *E. perfoliatum*, formed adjacent concentric rings, the former on the inside. No other pond had just this combination, and each had some special character of its own. One was fairly alive with *Myriophyllum tenellum*, which was absent from the others; another made a specialty of *Potamogeton*, which was lying in great windrows on the shore.

The limitation of species to single localities makes it rather unsafe to say that any species does not occur in Eastham, but I feel sure that any species I did not see, if occurring at all, must be rare. As species of single stations may be noted, among others, *Apios tuberosa*, *Vitis labrusca* and *Spiraea tomentosa*; *S. latifolia* was not seen at all. *Epilobium coloratum* and *E. adenocaulon* were found, but no *E. angustifolium*. *Asclepias incarnata* var. *pulchra* was not uncommon, *A. amplexicaulis* was generally distributed, *A. tuberosa* I saw once only;

farther up the cape it is abundant, and there was no *A. syriaca*. Of *Solidago* I saw only five species; *S. sempervirens* already mentioned, *S nemoralis* in dry fields, *S. tenuifolia* common by roadsides, *S. ulmifolia* once near a swamp, and *S. odora*, common in fields. *Hieracium* was represented by *H. Marianum*, *H. venosum* and *H. Gronovii*, all common; no introduced species were seen. There was an abundance of *Antennaria* in the fields, varying much in size and appearance, but it proved to be all *A. plantaginifolia*. *Gerardia paupercula* was the only representative of that genus; *Ranunculus repens* was the only crowfoot, and that I saw only in one station; the *Ranunculaceae* in general were poorly represented. I saw no *Oenothera* except *O. muricata*; there was a much condensed form of *Cirsium pumilum* and some fairly good *C. discolor*, but no *C. lanceolatum* nor *C. arvense*; it speaks much for the poverty of a soil when it will not support Canada thistle. Of the *Saxifragaceae* I saw only a few plants of *Ribes oxyacanthoides*, and the *Cornaceae* were quite unrepresented. So were the genera *Rudbeckia*, *Arctium*, *Geranium*, *Thalictrum*, *Anemone*, *Aquilegia*, *Berberis*, *Desmodium* and *Crataegus*. In riding on the train to Boston it is interesting to notice, one after another, the appearance, often in abundance, of the species lacking in Eastham; a great patch of *Thalictrum* in Brewster; *Rudbeckia* in Harwich, and so on. I would have added succory as appearing near the old glass works in Sandwich, but for one plant that I found in Eastham in what had been a strawberry bed, but now run to weeds; beside it were two tall blackberry bushes, the only high blackberries in the region, where the common blackberry is *Rubus villosus* var. *humifusus*, lying flat on the ground and working havoc with shoes and stockings, but supplying what seems to me the finest fruit of all the blackberries, large grained, sweet and juicy. The flat artificial level of another deserted strawberry patch was a dense mass of *Verbena hastata*, as high as a man's head; I did not see this species elsewhere in the town. Even as regards weeds there are peculiarities. A few stunted plants of *Amaranthus retroflexus* and *A. graecizans* were the only representatives of the genus; occasional plants of *Anthemis Cotula* and *Linaria vulgaris* were to be seen, but they were by no means common. *Artemisia Stelleriana* abounded along the shore, *A. caudata* everywhere; the latter species seems at home in sand inland as much as at the shore. Some of the more recent importations in weeds were well established; *Bromus tectorum*, *Brassica arvensis* and *B. juncea*, *Sisymbrium altissi-*

mum as well as the old *S. officinale* var. *leiocarpum*. *Euphorbia Cyparissias* had spread from old gardens, and in many cases had bracts of a very deep orange, brighter than I remember seeing elsewhere.

The family *Cistaceae* seemed to find conditions fairly comfortable, as *Helianthemum canadense* and *H. majus*, *Hudsonia tomentosa* and *H. ericoides*, and *Lechea maritima* were all abundant. Of the *Iridaceae*, *Iris versicolor* was not uncommon; *Sisyrhinchium angustifolium* and *S. atlanticum* seemed about equally frequent. Of *Liliaceae* I saw only *Lilium philadelphicum* (in 1906 only; 1907 and 1908 were dry seasons and it did not appear), *Smilacina stellata*, *Smilax rotundifolia* and *Asparagus officinalis*, the last escaped from cultivation and common. In nearly every family curious absences could be noted, which it would take too long to detail. I secured only six species of *Carex*, three of *Cyperus* and six of *Juncus*; evidently the locality is better suited to *Juncus* than to the others. Violets were not common, but in one place I found *Viola fimbriatula* growing and fruiting freely in pure quartz sand, no other plant in its vicinity but *Ammophila*. The common *Oxalis* was *O. stricta*, with large flowers of a deeper yellow than in *O. corniculata*, our usual species near Boston. The most showy flower was *Hibiscus Moscheutos*, whose large, Hollyhock-like flowers seemed strangely out of place in their impoverished surroundings.

It remains to mention a few species, whose occurrence here is of definite interest. Along the roadsides all through the town, was a plant with dense tufts of gray-green linear leaves, which in early summer bloomed and proved to be the old-fashioned garden pink, *Dianthus plumarius*. It does not appear in the Manual, but is evidently quite at home here. *Trifolium dubium*, not a common plant generally, was not infrequent. The only *Amelanchier* was the rather unusual *A. oblongifolia* var. *micropetala*; *Plantago aristata* var. *Nuttallii*, a form not mentioned in the Manual, was not uncommon in dry fields. In Rhodora, Vol. XI, p. 58, will be found mention of a small *Aster* which I found here, which has proved to be of interest in settling a doubtful point as to *A. surculosus*; and the occurrence here of *Agropyron pungens* considerably extends its range, and probably establishes its title, which has been disputed, to native American citizenship. The finding of *Lactuca Morssii* also extends a range, in this case of a "Rhodora species." In closing this list of species, I must add the consecrated formula. "Through the kindness of Prof. Fernald of the

Gray Herbarium the specimens in question have been identified" etc., etc. In this case the number of specimens was large, the proportion of interesting ones small, and more than the usual thanks are due for the work involved. All the specimens have been incorporated in the herbarium of the New England Botanical Club.

What general conclusion, if any, can be drawn from these notes? In Eastham the conditions of sterile sandy soil, lack of drainage or water courses, remoteness from active human influences, and increased influence of saline conditions are carried to an extreme, as compared with the region near Boston, with much the same climate; and we find: — within the range of salt water, practically the same flora; strictly aquatic plants, practically the same; domestic plants, not cultivated but thriving near cultivation, largely the same but keeping close to house or barn; weeds, many absent, a few, *Spergula* for instance, more abundant than usual, but most species in a reduced form; trees few and stunted but covering much ground; few fruit-bearing plants, but two, the beach plum and the low blackberry, luxuriant and with delicious fruit; herbaceous plants with few species but often many individuals, grasses, sedges and rushes especially few species; of the larger families *Cistaceae* and *Leguminosae* apparently best represented, *Labiatae*, *Ranunculaceae*, *Cornaceae* and *Saxifragaceae* with poorest representation; ferns, fungi and lichens, not strong; algae, marine and fresh water, well represented. On the whole, probably not half so many species as would be found in Swampscott, Cohasset or any similar seashore town near Boston. Poverty everywhere when out of reach of fresh or salt water.

Is time likely to bring any change? It is hard to say, but when we compare the desolate appearance of the town today with the accounts of what it has been, it seems to be going to the bad generally. As a boy I remember great fields of corn and rye where now are only dense woods of pitch pine; I have seen linen cloth, spun and woven on the spot, from flax raised there. Of course much of this change is due to changed social conditions; a farmer's family can no longer produce most of what it needs; work is specialized, and two or three acres of asparagus, tended by one man for three or four months of the year, now bring more actual money to the family than the whole labor of a family on a large farm did in the old times. But for the town as a whole, the diminution of fertility has been marked. In the History of Eastham by the Rev. Enoch Pratt, published in 1844, changes

of this kind are noted. Speaking of a part of the town he says, "This barren tract, containing about 1700 acres, which now has hardly a particle of vegetable mould, formerly produced wheat and other grain." But of the part of the town under cultivation he says "The raising of grain is the principal business to which farmers attend. More corn is produced than the inhabitants consume. More than a thousand bushels are sent to market, and in years past more than three times that quantity has been exported. This is the only town in the county that raises sufficient for its own consumption." No grain whatever is now raised. "Except a tract of oaks and pines adjoining the south line of Welfleet, and which is about a mile and a half wide, no wood is left in the township. The forests were imprudently cut down many years ago, and no obstacle being opposed to the fury of the wind, it has already covered with barrenness the large tract above described, and is still encroaching on other parts." The pitch pines are now covering not only the deforested area to which he refers, but also much of the ground which produced the grain for export. The sand no longer blows over this area, and in time, probably a long time from a human point of view, vegetation might find more favorable conditions, but a new element has entered the problem, of which the Rev. Mr. Pratt never dreamed. Every year wood fires are started by sparks from the locomotives, often killing the trees over hundreds of acres, and what is worse destroying all the leaf mold and other vegetable matter that has accumulated, so that it is doubtful if another growth, even of pitch pine, is possible. On the whole, it seems probable that less favorable rather than more favorable conditions are to be looked for as to the plants of general distribution. The little local floras of the ponds, however, will probably long continue.

Malden, Massachusetts.

THE NORTH AMERICAN SPECIES OF BARBAREA.

M. L. Fernald.

A recent attempt to determine satisfactorily some specimens of *Barbarea* from different regions of North America has led the writer to make a somewhat detailed study of the genus. In the course of this study it has become apparent that the species, which are notoriously difficult of delimitation, have more definite characters of foliage and fruit than we have generally supposed, and that in some cases our interpretation must be changed by a more accurate knowledge of certain of the older species. In the interpretation of the European species the writer has gained much assistance from the treatment of the genus and the critical notes of Rouy & Foucaud [1] and the earlier observations of Des Moulins.[2]

As commonly interpreted, *Barbarea* in America consists of *B. vulgaris* R. Br. (including *arcuata*) with divergent or arcuate-ascending pods, introduced eastward but said to be indigenous from Lake Superior northward and westward; *B. stricta* Andrz., with closely appressed pods, occurring across boreal America and coming south to Virginia, the Great Lake region, Missouri, and along the Rocky Mts.; and *B. verna* (Mill.) Asch. (*B. praecox* Sm.), an introduced garden-plant. Recently, however, Dr. Rydberg has characterized the plant of the Rocky Mts. as *B. americana*.

An inspection of all the American material in the Gray Herbarium and the herbarium of the New England Botanical Club shows that our Barbareas fall into two rather clearly marked groups. The first group consists of plants which are represented in these collections only by specimens from the older settled portions of America (chiefly in the East) and which, although now naturalized, were probably introduced from Europe. In all these plants the beak of the silique, formed by the persistent style, is very slender and elongate (2–3 mm. long) and the uppermost leaves of the stem are coarsely dentate, angulate, or lobed, but very rarely pinnatifid. These plants include the introduced *Barbarea vulgaris*; another probably introduced plant which has been passing in the Eastern States as *B. stricta*; and a singular short-

[1] Fl. de France, i. 196–203 (1893).

[2] Catalogue raisonné des Phanérogames de le Dordogne, 2e. fasc. du Suppl., 20–54 (1849).

podded plant from Seattle, Washington, which is specially commented upon in the Synoptical Flora.

The second group is typified by the sometimes cultivated European *Barbarea verna* (Mill.) Asch. (*B. praecox* Sm.), the silique of which has a characteristically short broad beak (0.5–2 mm. long) and the cauline leaves of which are lyrate-pinnatifid. Besides this introduced *B. verna*, however, we have in America a number of well marked indigenous plants with short thick beaks and usually lyrate-pinnatifid upper leaves. The most widely distributed of these is the plant named by Dr. Rydberg *B. americana*, but taken by many other recent authors to be indigenous forms of both *B. vulgaris* and *B. stricta.*

The relationships and identities of certain of these plants demand special consideration and they may be most appropriately discussed in the order mentioned in the two groups above.

Barbarea vulgaris, the common introduced plant of the East, is fairly well understood, but the status of *B. arcuata* Reichenb., sometimes distinguished as a subspecies or a variety from *B. vulgaris* is more doubtful. *B. arcuata* is often separated, at least varietally, by the slightly larger flowers which are more loosely disposed in anthesis, the slightly arcuate and more slender siliques, and the narrower seeds; but in the American specimens examined these characters do not seem sufficiently marked to make it clear that we have two different plants.

The plant which has been passing in the eastern United States as *Barbarea stricta* Andrz. differs, as already intimated, from the more northern indigenous plant which has been identified with it in the longer slender beak of the pod and the angulate or coarsely toothed but rarely pinnatifid upper leaves. This plant of the Eastern States, like *B. vulgaris*, is found chiefly in the neighborhood of settlements, and though it is commonly recognized by its closely appressed and crowded siliques it is often found with some of the pedicels spreading in such a way as to suggest *B. vulgaris.* With its foliage, siliques, and beaks essentially as in *B. vulgaris*, and differing only in having the siliques closely appressed, this plant seems more appropriately considered a variety of the latter species than specifically distinct. But that the plant is really *B. stricta* Andrz., with which it has generally been identified, is very improbable. True *B. stricta* of Europe (*B. parviflora* Fries) as shown by specimens from Fries, Blomberg, Andersson, and Heimerl and as treated by recent European writers on the genus, is a plant of northern and northeastern Europe with the upper

cauline leaves oval, crenate, and slightly if at all lyrate or angulate, and the stoutish beak of the silique only 0.5–1 mm. long. Our common plant of the East which has passed as *B. stricta* has the upper cauline leaves coarsely angulate-dentate and the beak of the silique is rather slender and 2–3 mm. long. In these characters it matches material from England and western and central Europe which has been erroneously passing as *B. stricta*, but which is treated by Rouy & Foucaud as *B. vulgaris*, subsp. *vulgaris*, var. *longisiliquosa* Carion.

The other plant with elongate slender style, the plant from Seattle, Washington, specially noted in the Synoptical Flora [1] on account of its very short siliques, is apparently the var. *brachycarpa* of Rouy & Foucaud.

Of the plants of the second group, i. e., those with the upper cauline leaves mostly lyrate-pinnatifid and with short thick styles, *Barbarea verna* (*B. praecox*) needs no discussion. The indigenous species, however, demand special comment. The most broadly distributed of these has short thickish pedicels and is the plant thought by early students of our flora to be identical with the European *B. praecox* (*B. verna*). Richardson, Chamisso & Schlechtendal, Sir Wm. Hooker, Torrey & Gray, and their contemporaries all considered it *B. praecox*, Hooker separating it from *B. vulgaris* by the "*stigma* short, nearly as broad as the valve." [2] Nuttall apparently considered it a distinct species, his *B. gracilis*,[3] from "Oregon," but subsequent authors have generally identified it with the European *B. vulgaris* or *B. stricta*. From *B. verna* (*B. praecox*), to which the indigenous plant is very closely related, it differs in its basal leaves; those of the former plant having very numerous small leaflets, those of our northern species very few or none. From *B. vulgaris* and its variety *longisiliquosa* our plant is quickly separated by the characters already emphasized. From true *B. stricta* the plant is readily distinguished by its much longer pods and by the narrower more lyrate-pinnatifid upper leaves. Recently this distinct plant with "pod 2–2.5 cm. long and scarcely 2 mm. wide, slightly angled, ascending, or at first nearly erect, on pedicels 2–3 mm. long; style very short, scarcely 0.5 mm. long," [4] has been named by Rydberg *B. americana*. The plant

[1] Robinson in Gray, Syn. Fl. i. fasc. 1. 150 (1895).
[2] Hook, Fl. Bor.-Am. i. 40 (1829).
[3] Nutt. ex Torr. & Gr. Fl. i. 75 (1838).
[4] Rydb. Mem. N. Y. Bot. Gard. i. 174 (1900).

covered by his description varies in the degree to which the pods are appressed, but as Rydberg's description indicates, there is no clear line to separate these minor variations. As described by Rydberg his *B. americana* occurs from "Northwest Territory" to Montana and Nevada; but the plant is widely distributed in our boreal and mountain regions, occurring from Ungava Bay, Labrador, south to river-banks and mountain-ravines of northern New England, northwestward to arctic Alaska, the Aleutian Islands, and adjacent northeastern Asia, and southward in western America to Colorado, and southern California. But clearly defined as is this plant, which is so typically a species of our boreal flora, it seems to have had but one well established name (excluding the doubtfully published *B. gracilis* of Nuttall[1]) prior to that assigned to it by Rydberg. In 1824, Ledebour published the Siberian *B. orthoceras*[2] with the pedicels of the siliques erect. Material of this species collected in Amur by Maximowicz is quite identical in basal and cauline leaves, strongly ascending pods, and short thick styles with American material which has been determined by Dr. Rydberg as *B. americana*; and there seems no reason why the name *B. orthoceras* Ledeb. should not be taken up for the plant which, widely distributed in our boreal and montane regions, extends, like so many of our other plants, by way of the Aleutian Islands and northwestern Alaska to the northeastern regions of Asia.[3]

In the southern part of its range *Barbarea orthoceras* is less characteristic than northward, the siliques tending to be longer, more divergent, and somewhat remote instead of strongly ascending or appressed and forming a dense slender raceme. Many transitional tendencies occur, however, and the longer-podded extreme seems best considered a variety of *B. orthoceras*, standing in the same relation to it as *B. vulgaris* to its var. *longisiliquosa*.

Another indigenous species, of unusual interest because of its peculiar habit of bearing in the lower part of the primary racemes leafy bracts

[1] Nuttall apparently did not formally publish *Barbarea gracilis* though it is ascribed to him by Torrey & Gray with the remark that "Mr. Nuttall thinks that the var. β [var. *gracilis* from "Oregon"] is a distinct species which he calls *B. gracilis*. Nuttall's plant, labeled distinctly in his own handwriting "*Barbarea gracilis. B vulgaris*, β. *gracilis* DC. Oregon woods," is in the Gray Herbarium and has been re-labeled by Dr. Rydberg "*B. americana* Rydb. P. A. R."

[2] Ledeb. Hort. Dorp.(1824) and Fl. Ross i. 114 (1841).

[3] It is probable that *Barbarea orthoceras* occurs across the colder regions of Eurasia to arctic Europe. Rouy & Foucaud, discussing the European species say: "La forme des régions arctiques est le *B. orthoceras* Ledeb."; and Nyman's Conspectus and the Index Kewensis treat Fellman's *B. stricta* from Lapland as *B. orthoceras*.

which subtend the flowers, is confined to the southern Alaskan and Aleutian region, extending by way of the Aleutian Islands to the coast and islands of Kamchatka and Amur. This distinct plant, which, in the presence of well developed floral bracts suggests the local *Barbarea bracteosa* Guss. of Sicily and the Neopolitan district, differs from that southern plant in many details. It seems, with little question, to be C. A. Meyer's *B. planisiliqua*, originally described from the region of the Ochotsk Sea but stated by Tiling in his more detailed account of the plant to occur also on Unalaska.[1] The citation of *B. planisiliqua* from Unalaska is significant since, of the numerous specimens of *Barbarea* examined from Alaska, only one species — the plant under discussion — has been found from Unalaska. During the Jaggar Expedition to the Aleutian Islands in 1907 Dr. Edwin C. Van Dyke collected both *B. orthoceras* and the plant with leafy-bracted inflorescence; and it is notable that he, like earlier collectors, found on Unalaska only the latter species.

The conclusions reached in this study of *Barbarea* in North America may be summarized as follows,

* Beak of the silique slender, 2–3 mm. long: uppermost leaves incised, coarsely dentate, angulate, or lobed, but rarely pinnatifid.

Barbarea vulgaris R. Br. Glabrous throughout: radical and lower cauline leaves green, rarely purple-tinged, usually pinnatifid; the terminal lobe large, suborbicular to elliptic-oblong; lateral lobes 2–4 pairs (rarely none), the upper pair larger than the lower: middle leaves lyrate-pinnatifid: uppermost leaves obovate or oblong, coarsely dentate or angulate above the middle, often incised but scarcely pinnatifid below: flowers orange-yellow, showy: siliques 2–3(–4) cm. long, subterete to quadrangular, on more or less divergent or spreading-ascending slender pedicels.— R. Br. in Ait. Hort. Kew. ed. 2, iv. 109 (1812); Am. auth., as to the introduced plant of the East. *Eyrsimum Barbarea* L. Sp. Pl. ii. 660 (1753). *Sisymbrium Barbarea* Crantz, Stirp. Austr. fasc. i. 54 (1769). *Erysimum lyratum* Gilib. Fl. Lith. ii. 59 (1782). *B. taurica* DC. Syst. ii. 207 (1821).[2] *B. arcuata* Reichenb. Flora, v. 296 (1822).[1] *B. vulgaris, γ. arcuata* Fries, Novit. Fl. Suec. 205 (1828); Gray, Man. ed. 2, 35 (1856) in part. *B. lyrata*

[1] "Ich sah Pflanzen aus verschiedenen Gegenden Ost-Sibiriens, aus Kamtschatka, von den Kurilen und aus Unalaschka" — Regel & Tiling, Fl. Ajan. 46 (1858).

[2] *Barbarea taurica* and *B. arcuata* are treated by Old World students of the genus as identical, and by many the plant (under the name *B. arcuata*) is kept separate from *B. vulgaris*. If such separation is maintained the name *B. taurica*, it should be noted, will have to be used instead of *B. arcuata*, which was published in the succeeding year.

Asch. Fl. Brandenb. i. 35 (1864).[1] *B. Barbarea* [as *barbarea*] MacMillan, Met. Minn. Val. 259 (1892). *Campe Barbarea* [as *barbarea*] W. F. Wight in Piper, Contrib. U. S. Nat. Herb. xi. 303 (1906) as to synonyms but not as to plants cited.— Brooksides, meadows, roadsides, and waste places, chiefly near settled regions, abundantly naturalized from Eurasia; New England to Michigan, Kansas, and Virginia.— A double-flowered form is established about the city of Quebec.[2]

Var. **hirsuta** (Weihe), n. comb. Basal leaves and often upper leaves and stem hirsute.— *B. hirsuta* Weihe, Flora, xiii. 257 (1830). *B. vulgaris*, β. *bracteata*, sub-var. *hirsuta* Rouy & Foucaud, Fl. Fr. i. 198 (1893) — Introduced in fields at North Berwick, Maine (*Parlin*).

Var. BRACHYCARPA Rouy & Foucaud. Foliage as in typical *B. vulgaris*: siliques 1–1.5 cm. long.— Fl. Fr. i. 198 (1893). *B. stricta*, form, Robinson in Gray, Syn. Fl. i, fasc. i, 150 (1895). *Campe stricta* W. F. Wight in Piper, Contrib. U. S. Nat. Herb. xi. 303 (1906) as to plant, but not as to name-bringing synonym.— Introduced at Seattle, Washington (*Piper*).

Var. LONGISILIQUOSA Carion. Foliage as in *B. vulgaris*: siliques closely appressed to the rhachis, 2–3 cm. long.— *B. vulgaris*, subsp. *B. rivularis*. β. *longisiliquosa* Carion, Pl. Saône-et-Loire, 16 (1859) according to Rouy & Foucaud, Fl. Fr. i. 199 (1893) — original description not seen. *B. vulgaris*, var. *stricta* Gray, Man. ed. 2, 35 (1856) and subsequent authors, in part, not Regel. *B. stricta* Bor. Fl. Centre de la Fr. ii. 48 (1840); Robinson in Gray, Syn. Fl. i. fasc. i. 150 (1895) as to the eastern plant in great part, not Andrz.— Naturalized from eastern Quebec to Michigan, Missouri, and Virginia.

* * Beak thickish, 0.5–1 (rarely 2) mm. long: uppermost leaves usually lyrate-pinnatifid.

+ Basal leaves with numerous (10–20) lateral leaflets.

B. VERNA (Mill.) Asch. Leaves all pinnatifid; the basal with rounded-oval or -oblong terminal lobe and numerous smaller lateral lobes: petals 6–8 mm. long, bright yellow: pedicels 3–8 mm. long, as

[1] *Barbarea lyrata* Asch. was based on *Erysimum lyratum* Gilib. (1782), a name which antedates the maintained *Barbarea vulgaris* R. Br. (1812) by thirty years. But by Article 48 of the Vienna Code "the first specific epithet . . . . must be retained or must be re-established, unless, in the new position there exists one of the obstacles indicated in the articles of section 7." and by Article 51 (1). "Every one should refuse to admit a name . . . . when the name is applied in the plant kingdom to a group which has an earlier valid name." Our plant as an *Erysimum* already had the valid name *Erysimum Barbarea* L. (1753), therefore the specific name *lyratum* is inadmissible. For discussion of this principle of 'still-born (*totgeborenen*)" names see Schinz & Thellung, Bull. Herb. Boiss. Sér. 2, vii. 101 (1907), also circular-letter of 10 December, 1907; and Rendle & Britten, Journ. Bot. xlv 433 (1907).

[2] In June, 1895, Dr. B. L. Robinson collected at Waverly, Massachusetts, a plant which closely simulates the Asiatic *B. plantaginea* DC., but its immature condition renders it unwise so to name it with positiveness. *B. plantaginea*, which appears only varietally separable from *B. vulgaris* has all but the lowermost leaves elliptic or oblong and merely dentate, the principal cauline leaves of *B. vulgaris* (excluding the uppermost) being lyrate-pinnatifid.

thick as the long (4–8 cm.) slightly flattened rigid ascending siliques.— Fl. Brandenb. 36 (1864). *Erysimum vernum* Mill. Dict. ed. 8, no. 3 (1768). *Erysimum praecox* Sm. Fl. Brit. ii. 707 (1800). *B. praecox* R. Br. in Ait. Hort. Kew. ed. 2, iv. 109 (1812).— Somewhat cultivated as a salad under the names Belle Isle Cress, Early Winter Cress, and Scurvy Grass, and locally naturalized in the Eastern and Southern States.

+ + Basal leaves simple or with 2–6 lateral leaflets.

++ Stems or branches leafy only to the base of the finally elongate racemes.

B. orthoceras Ledeb. Grabrous, strict, the stem and lower leaves often purple-tinged: basal leaves oblong or elliptic, simple or with 2 or 4 small lateral leaflets: lower and middle cauline leaves more decidedly lyrate-pinnatifid, ordinarily with 4–12 small leaflets: uppermost oblong or narrowly obovate, lyrate-pinnatifid, with few basal lobes: racemes in anthesis densely flowered, in fruit elongate and slender: sepals pale: petals pale yellow, 2.5–5 mm. long: siliques subterete or compressed, not conspicuously angled, 2–3.5 cm. long, somewhat crowded, strongly ascending or appressed, on thick pedicels 3–8 mm. long.— Hort. Dorp. (1824), and Fl. Ross i. 114 (1841). *B. praecox* Richardson, Frankl. Jour. App. 15 (1823); Hook. Fl. Bor.-Am. i. 39 (1829); T. & G. Fl. i. 75 (1838); not Sm. *B. vulgaris*, *β. gracilis* T. & G. l. c. (1838), perhaps not DC. *B. gracilis* Nutt. ex T. & G. l. c. (1838). *B. vulgaris*, var. *stricta* Gray, Man. ed. 2, 35 (1856) and subsequent Am. auth. in part, not Regel. *B. stricta* Fellm. Pl. Vasc. Lapp. 6 (1864–1869); Robinson in Gray, Syn. Fl. i. fasc. i. 150 (1895) in part ; not Andrz. *B. Barbarea* [as *barbarea*], var. *stricta* MacMillan, Met. Minn. Val. 259 (1892) in part, but not as to name-bringing synonym. *B. americana* Rydb. Mem. N. Y. Bot. Gard. i. 174 (1900). *Campe Barbarea* [as *barbarea*] W. F. Wight in Piper, Contr. U. S. Nat. Herb. xi. 303 (1906) in part, but not as to name-bringing synonym.— Banks of streams or in swamps, northern Labrador to northwestern Alaska, south to the St. John River, Maine, Mt. Washington, New Hampshire, shores and islands of Lakes Huron and Superior, Colorado, and southern California; also from northeastern Asia to arctic Scandinavia. Passing by numerous gradations to

Var. **dolichocarpa,** n. var., siliquis patulis vel adscendentibus remotis vel subremotis subincurvis 2.5–5 cm. longis.— Siliques spreading or ascending, remote or subremote, somewhat incurved, 2.5–5 cm. long.— British Columbia to Wyoming, south to Lower California and central Mexico. Type collected on wet ground in woods, western Klickitat Co., Washington, May 19 and July, 1891 (*W. N. Suksdorf*, no. 2022). Some other numbered specimens are Wyoming, Union Pass, August 10, 1894 (*A. Nelson*, no. 864): California, near summit of Mt. Sanhedrin, Lake Co., July 20, 1902 (*A. A. Heller*, no. 5925): Arizona, vicinity of Flagstaff, altitude 7000 feet, June 1, 1898 (*D. T. MacDougal*, no. 24): Mexico, Cuantillan, Valley of Mexico, May 13, 1899 (*C. G. Pringle*, no. 7740).

++ ++ Lower pedicels of the comparatively short and thick raceme subtended by leafy bracts.

B. PLANISILIQUA C. A. Meyer. Similar to *B. orthoceras* but with the shorter racemes bearing during anthesis 4–8 conspicuous lyrate-pinnatifid leafy bracts, which are somewhat deciduous in the mature plant; the sepals deeper-colored or purple-tinged; the petals 7–9 mm. long; the secondary racemes corymbiform; and the flattish ascending or erect siliques on comparatively slender pedicels and with more pronounced subconical beak.— C. A. Meyer in Middendorff, Reise, i. pt. 2, 14 (1856); Regel & Tiling, Fl. Ajan. 45 (1858). *B. vulgaris*, var. *arcuata* Robinson in Gray, Syn. Fl. i. fasc. i. 149 (1895) as to Alaskan plant, not Fries.— Southern Alaska and the Aleutian Islands to Kamtchatka and Amur. In its distribution very typical of the range of a considerable portion of the Aleutian flora —*Erigeron salsuginosus* (Richardson) Gray, var. *unalaschcensis* (Less.) Macoun, *Arnica unalaschcensis* Less., *Hieracium triste* Cham., &c.— which occurs from southern Alaska through the Aleutian Islands to the islands or mainland of Kamtchatka or Amur.

GRAY HERBARIUM.

STATUS OF EPILOBIUM ALPINUM AND EPILOBIUM HORNEMANNI.

ALBERT HANFORD MOORE.

While studying the alpine willow herbs from the White Mountains in connection with a flora of Coös County upon which Prof. Arthur Stanley Pease and the writer are engaged, I found that they presented a number of problems about which the widest differences of opinion have existed, the solution of which was by no means simple.

The opinion advanced, and I believe originated, by Haussknecht, that the seeds of *Epilobium alpinum* L. and *E. Hornemanni* Reichenb. are different, has been generally accepted since the publication of his monograph. He says of the seeds of *E. lactiflorum* Hausskn., by which name he calls *E. alpinum*, "testa glabra, lacunoso-impressa," [1] but of the seeds of *E. Hornemanni* he says, "testa tenuiter papillosa." [2] Trelease in his Revision of the Genus Epilobium [3] accepts this view

[1] Haussknecht, Monographie der Gattung Epilobium, 158 (1884).
[2] Ib. 174.
[3] Missouri Botanical Garden Reports, ii, 75–116 (1891).

but admits having seen some smooth-seeded examples of *E. Hornemanni.* When I examined the seeds of these two species by reflected light under a moderately high power of the microscope, I found that some of them, indeed, plainly answered to the description lacunoso-impressa. A number of times I believed that I had a papillate seed before me, but by carefully focussing and varying the light I observed that it was an illusion. The seeds of both *Epilobium alpinum* and *E. Hornemanni* are in fact covered with pits, the walls of which are more or less prominent according as the seeds are old and shrivelled or in good condition. The former appear more strikingly papillate. This effect is produced by the light falling in a certain way on the margin or corners of the irregularly circular impression. How it is possible for a pit to look like a papilla is fairly well shown by some of the figures in Barbey's Epilobium Genus a Cl. Ch. Cuisin Illustratum. The artist has drawn shaded circles which on the margins of a seed resemble papillae.[1] In Haussknecht's monograph, plate 1, figure 13, represents a seed of *E. lactiflorum*, figure 18 one of *E. Hornemanni* Reichenb. The cuts show that so low-powered a lens was used that no certain judgment of the facts could have been formed.

The upper surface also of the seeds often looks papillate when the lighting is too bright. Any one familiar with a microscope knows that a too brilliant illumination makes it difficult to determine the true nature of structures which one apparently observes. I also investigated the seeds after they had been wet for a while, to see if they would look papillate after swelling, but with no different result. However, the most important thing for the present purpose is that the seeds of the two species do not differ in any respect.[2]

The only real characters suggested to distinguish the plants which have proved satisfactory are of relatively little importance, and I could find no others to supplement them. These differences are easy to see when the specimens are fresh, but difficult after they are dried, yet notwithstanding they can in many cases be made out with a fair degree of certainty even then. Collectors, however, should be urged to make careful notes on their labels.

In *E. alpinum* L., as that species has recently been understood by

[1] See, e. g., *Epilobium Khasianum* C. B. Clarke, pl. 16, fig. 5.

[2] Trelease in his monograph says that the seeds of *E. alpinum* are more attenuate, but this does not seem to hold either.

Trelease in his revision or in the seventh edition of Gray's Manual, for instance,[1] the flowers are white,[2] and the leaves are light green. The leaves have also been described as thinner than in *E. Hornemanni* Reichenb., but it is quite likely that this effect is optical, due to the greater translucency of the coloring matter. At bes it is a very uncertain character, as the apparent difference is so slight that the leaves of *E. Hornemanni* may become thinner on pressing, if they are not sometimes so to begin with. In the last named species the flowers vary from rose or lilac to deep purple, the leaves being darker and often suffused with purple.[3]

In view of these facts it seems best to treat one of the species as a color form of the other, but before doing this it is necessary to make sure that *E. alpinum*, which is obviously the older name, has been correctly interpreted. In the Species Plantarum [4] Linnaeus says nothing about the color of the flowers, but refers to a description in his Flora Lapponica [5] which reads as follows:

EPILOBIUM *foliis ouato-oblongis integerrimis.*
? Chamænirium alpinum alsines foliis. Scheuch. alp. 59.

α Plantulam hanc bis vel ter in Alpibus lapponicis legi, præsertim ad latera earum, præcedentibus congeneribus mixtam.[6]

β *Caulis* simplex, vix dimidii digiti longitudine, parum rubescens.

Folia opposita, inferiora minora ouata, superiora maiora & magis oblonga, integerrima omnia.

Flores duo, rubri, parui, caulem terminantes, petalis emarginatis purpureis.

γ Conueniunt hæc & antecedentes duæ (148.149.) florum corolla parua, petalisque bifidis & æqualibus.

Linnaeus likewise refers to *Epilobium foliis ovalibus, superioribus attenuatis* L. Flora Suecica, 111 (1745), which throws no light on the subject of color. From what has gone before, it would appear plain that it was *E. Hornemanni* which was meant and not the white-flowered form as has been supposed, but the matter is not quite so simple. Although this was apparently the older view (for if we turn to Flora

[1] Cf. also *E. lactiflorum* Hausskn, Monographie, 158; Gray Manual, ed. VI, 189 (1890).

[2] According to Gray Manual, ed. VII, 597 (1908) also "pinkish."

[3] Mr. H. H. Bartlett assures me that it has been demonstrated in a number ot analogous cases that it is the same purple coloring matter as in the flowers which makes the leaves darker or purplish.

[4] p. 348.

[5] p. 114 (1737).

[6] Note the uncertainty.

Danica, ii, pl. 322 (1766) or to Sowerby's English Botany, xxvii, pl. 2001 (1819), for example, we find *Epilobium alpinum* L. represented as having purple flowers and various synonyms of *E. alpinum* prove to have had colored ones), nevertheless Haussknecht [1] adopts the name *lactiflorum* for the white-flowered plant, describing it as having milk-white flowers (flores lactei), maintaining that the Linnaean *E. alpinum* was a *species mixta* consisting of two elements, a white-flowered form, represented by two specimens in the herbarium of Linnaeus, the one doubtfully, the other certainly identified, and the *Chamaenirium alpinum alsines foliis* Scheuch. questioningly cited in the Flora Lapponica, but unfortunately taken over into the Species Plantarum without any mark of interrogation. In this Haussknecht says that Scheuchzer first included *E. anagallidifolium* Lam. and *E. alsinefolium* Vill., but subsequently the latter only. In his monograph, under the caption of *E. lactiflorum*, Haussknecht says, "Nach Ansicht der meisten Scandinavischen Botaniker wäre in dieser Pflanze das eigentliche E. alpinum L. zu erblicken, weil dieselbe sowohl in Linné's Herbar als E. alpinum vorhanden ist und die Phrase in Fl. Lapp. und in Fl. Suec. nur auf diese gedeutet werden kann,[2] abgesehen von den dabei gegebenen, zu E. anagallidif. gehörenden Citaten." Further on he continues, "In Annotat. pl. Scand. herb. L. 1849 sagte bereits Hartman, dass das E. alpinum im Herb. Linné völlig mit der obigen Art [*E. lactiflorum*] übereinstimme." This is what Hartman says,[3] *E.* "*alpinum* 7 (manu propr.). Nihilo, nisi floribus tribus (pro 'duobus') foliis subdenticulatis (pro 'integerrimis'), atque caule paulum altiore a descriptione Linnaeana numeri 150 Fl. Lapp.[4] differens, hoc specimen optimum est *E. alpinum* Suecor. recent." [5] Nor under the other specimen referred to by Haussknecht does Hartman refer to the color, but says, "Haec est forma pumila biuncialis, etiam melius ac praecedens Florae Lapp. l. c. respondens . . . ." At the end he adds the note, "Nullae aliae huius tribus, nec numeris 147 et 149 Fl. Lapp. respondentes, formae in herbario Linnaei adsunt." Under *E. alpinum* L. in his Handb. Skand. Flor. ed. XI, 263 (1879) Hartman cites Svensk.

[1] l. c.

[2] It has already been noted that the Flora Lapponica calls the flowers "rubri," the Flora Suecica not mentioning the color.

[3] Annotat. Plant. Scand. Herb. Linn. (Ex Act. Reg. Acad. Scient. Holm.) 76 (1849).

[4] See quotation of this description, above, p. 143.

[5] As we shall see presently *E. alpinum* Suecor. recent. is no clearer than any other *E. alpinum*.

Bot. x, pl. 707, 1826–1829 (a most excellent figure of *E. Hornemanni*) and the plate, Flora Danica ii, 322, already mentioned, but in the description he says, "kronbl. . . . . violettröda. . . . ell. hvita" and adds "Den mer högväxta och uppräta formen med flere blr och oftast hvita är *var. Hornemanni* (*Reich. pl. crit. 2*)." [1] This confused account does not seem definite enough to deny or affirm the strong implication of the Annotationes, for the description of the species may well be intended to include that of the variety. The conception of the white-flowered element seems thus to be disposed of, and even if it afterwards proved that the Linnaean specimens really had white flowers, they are not type specimens in our modern sense, so that such a discovery could not be taken as controverting the strong evidence that Linnaeus had a purple-flowered plant in mind when he wrote. The field now lies between *E. anagallidifolium* Lam. and *E. Hornemanni* Reichenb. The description given by Linnaeus in the Species Plantarum, as in the Flora Lapponica, answers much better to that of the leaves of *E. Hornemanni*, than to that of the narrowly elliptic to oblong leaves of *E. anagallidifolium*.[2] In the Species Plantarum, in addition to the doubtful Scheuchzerian name, is cited the name *Epilobium foliis ellipticis, obtuse lanceolatis* Haller Enum. Meth. Stirp. Helv. Indigen. i, 408 (1742). Haller writes of it as follows: Folia in rarioribus conjugationibus, ima ovata, superiora longiusculo mucrone in obtusam ellipsin attenuata, brevibus denticulis serrata. Flores. . . . petalis dilute purpureis. . . . [3] From this it is evident that *E Hornemanni* was included,[4] and if *E. alpinum* L. really is a mixed species, it depends for that character upon the reference to Scheuchzer. It would be very satisfactory to be able to remove this objection as well, but unfortunately Scheuchzer's work is not at hand. However, according to the so-called doctrine of remainders, which has been generally accepted and which, though it finds no adequate expression in the Vienna code, seems to be undoubtedly included in it,[5] the name *E. alpinum* must stand for *E. Hornemanni*, since the latter and its

[1] See footnote, 1, below, p. 146.

[2] In *E. anagallidifolium*, too, the leaves are almost alike, whereas in *E. Hornemanni* the upper leaves tend to be more attenuate than the lower.

[3] N. B. purple flowers again.

[4] Cf. also the name used in the Flora Suecica, *E. foliis ovalibus, superioribus attenuatis* L.

[5] See Règles Internat. Nomencl. Congr. Internat. Bot. Vienne Sect. 6, Arts. 44 and 47 (1905). I am indebted to Dr. B. L. Robinson for invaluable assistance in interpreting these rules.

oldest synonym *E. nutans* Hornem.[1] were both described later than *E. anagallidifolium* Lam. or *E. alsinefolium* Vill.; in other words it alone is left after the supposed conflicting elements have been removed. Now taking up the synonymy which Haussknecht gives for his *E. lactiflorum*; *E. alpinum* L. and *E. nutans* Hornem. have already been discussed. *E. alpinum* L. *β. fontanum* Hornem., not Wahl., is a pure synonym of *E. nutans*, having been based directly upon it without any accompanying description. (Under *E. alpinum* L. var. *fontanum* Wahl. Flora Lapponica, 95 (1812), the author cites as the first synonym *E. alsinefolium* Vill.[2] This, as far as one can tell without going deeply into the matter, is a purple-flowered species of Europe, and certainly as far as the plate is concerned it is a very distinct species.) *E. alpinum* L. *β. majus* Wahl. Flora Suec. i, 234 (1824) is also founded on *E. alsinefolium* (and hence is purple-flowered). *E. origanifolium* Lam. *γ. intermedium* Lindbl. Physiogr. Tidskr. 1838, is a reference given by Haussknecht. The periodical appears to be a very rare one, but an article on Epilobium by the same author occurs in Flora.[3] According to this, Lindblom's variety is based on *E. alpinum* L. *γ. nutans* Hartm. Handb. Skand. Flor. ed. III, 91 (1838). (Here is cited again Svensk. Bot. x, pl. 707 and Flora Danica, ii, 322.) *E. alpinum* L. var. *majus* Fr. Novit. Fl. Suec. Mant. ii, 20 (1839) is the only name remaining to be considered. In a note Fries says, "in var. *majori* semper lacteis." Here then for the first time is a mention of white flowers, but the only synonym given is *E. alpinum* L. *γ. nutans* Hartm. which, as we have just seen, has purple flowers. There seems therefore to be no available name for the white-flowered plant except *E. lactiflorum* Hausskn.

For convenient reference, I give below the correct names of the two plants with a summary of their more important synonymy.

Epilobium alpinum L. floribus inter lilacinos et purpureos variantibus.—Sp. Pl. ed. I, 348 (1853); Flora Dan. ii, pl. 322 (1766); Svensk. Bot. x, pl. 707 (1826–1829); Sowerby Engl. Bot. xxviii, pl. 2001 (1819); Hartm. Annotat. Plant. Scand. Herb. Linn. (ex Act. Reg. Acad. Scient. Holm.) 76 (1849).

[1] *E. Hornemanni* Reichenb. Iconogr. Bot. seu Plant. Crit. ii, 73, pl. 180, f. 313 (1824) was based on *E. nutans* Hornem. Flora Danica, viii, pl. 1387 (1810) which is an illustration of a plant with lilac flowers, in all respects resembling our common alpine species. It is interesting to note that the Index Kewensis correctly includes *E. Hornemanni* as a synonym of *E. alpinum*.

[2] Figured, Flora Dan. xv, pl. 2587 (1861).

[3] xxiv, 596 (1841).

E. foliis ovato-oblongis integerrimis L. Flora Lapp. 114 (1737).

E. foliis ellipticis, obtuse lanceolatis Haller Enum. Meth. Stirp. Helv. Indigen. i, 408 (1742).

E. foliis ovalibus, superioribus attenuatis L. Flora Suec. 111 (1745).

E. nutans Hornem. Flora Dan. viii, pl. 1387 (1810).

E. alpinum L. *β. fontanum* Hornem. Hort. Reg. Bot. Hafn. 365 (1813), not Wahl.

E. Hornemanni Reichenb. Iconogr. Bot. seu Plant. Crit. ii, 73, pl. 180, f. 313 (1824); Hausskn. Monogr. Gatt. Epilob. 174, pl. 1, fig. 18 (1884); Trelease Mo. Bot. Gard. Rep. ii, 105 (1891); Gray Man. ed. VI, 189 (1890); Id. ed. VII, 597 (1908).

E. alpinum L. var. *nutans* Hornem. Nomencl. Flora Dan. Emend. 66 (1827) (incorrectly attributed by Haussknecht to Lehmann).

E. alpinum L. *γ. nutans* Hartm. Handb. Skand. Flor. ed. III, 91 (1838).

E. origanifolium Lam. *γ. intermedium* Lindbl. Physiogr. Tidskr. 1838;[1] Flora xxiv, 596 (1841).

E. alpinum L. var. *majus* Fr. Novit. Fl. Suec. Mant. ii, 20 (1839).

E. ALPINUM L. f. **lactiflorum** (Hausskn.) A. H. Moore comb. nov. floribus lacteis vel raro colore roseo paulum tinctis.

E. alpinum Auct., not L.

E. alpinum L. var. *majus* Fr. Novit. Fl. Suec. Mant. ii, 20 (1839), as to note following description, but not as to synonym.

E. lactiflorum Hausskn. Monogr. Gatt. Epilob. 158, pl. 1, fig. 13 (1884); Trelease Mo. Bot. Gard. Rep. ii, 108 (1891), under the head of *E. alpinum* L.; Gray Man. ed. VI, 189 (1890); Id. ed. VII, 597 (1908), under *E. alpinum* L.

CAMBRIDGE, MASSACHUSETTS.

[1] Citation quoted from Haussknecht.

A Teucrium new to Massachusetts.— While botanizing on Cape Ann, Massachusetts, last September I noted with particular interest a species of *Teucrium* established a short distance east of Rockport very close to the shore. The plant was subsequently identified by Prof. M. L. Fernald as *Teucrium occidentale* Gray, var. *boreale* (Bicknell) Fernald. The colony comprised possibly 6 or 8 individual plants in various stages of maturity. Several were even then in full flower while others with mature spikes illustrated the characters in the calyx-lobes very plainly. The record seems of interest in that it extends the known range of the plant quite appreciably to the east and south.— Edwin B. Bartram, *Wayne, Pa.*

The New England Federation of Natural History Societies will hold a field meeting at Portland, Maine, July 6–12. A series of attractive excursions has been arranged to the neighboring beaches, islands, to Sebago Lake, the tourmaline quarry at Auburn, etc., also a dredging expedition. Headquarters of the meeting will be at the rooms of the Portland Society of Natural History, 22 Elm Street, near Monument Square, Portland. For further information persons interested should apply to J. H. Emerton, 194 Clarendon Street, Boston.

Vol. 11, no. 126, including pages 109 to 124, was issued 7 June, 1909.

Gray's New Manual of Botany—7th Edition

An illustrated flora of the Northern United States and Canada east of the 96th meridian. By Asa Gray, LL.D., late Professor of Natural History, Harvard University. Thoroughly revised and largely rewritten by Benjamin Lincoln Robinson, Ph.D., Asa Gray Professor of Systematic Botany, and Merritt Lyndon Fernald, S.B., Assistant Professor of Botany, Harvard University, assisted by specialists in certain groups. With more than nine hundred text figures.

Regular Edition. Cloth, illustrated, 8vo, 928 pages. Price, $2.50.

Tourist's Edition. Limp leather, $5 \times 7\frac{1}{2}$ inches. Price, $3.00.

AMERICAN botanists, who have been impatiently awaiting the revision of this indispensable work, will be delighted to know that a seventh, completely revised, and copiously illustrated edition, is now ready. The revision has entailed years of work by skilled specialists. No effort or expense has been spared to attain the highest degree of clearness, terseness, and accuracy. The plant families have been rearranged in a manner to show the latest view of their affinities, and hundreds of species have been added to the flora. The nomenclature has been brought into thorough accord with the important international rules recently established — a feature of great significance. Indeed, the Manual is the only work of its scope which in the matter of nomenclature is free from provincialism and rests upon a cosmopolitan basis of international agreement. Nearly a thousand figures have been added, and scores of brief and lucid keys have been introduced in a manner which greatly simplifies the problem of plant identification. The work has been extended to include Ontario, Quebec, and the maritime provinces of Canada.

AMERICAN BOOK COMPANY

New York Cincinnati Chicago Boston

HOME GROWN LILIES.

Fresh from Beds. Wild Flowers, Hardy plants of all kinds.
Send for catalogue.

F. H. Horsford, Charlotte, Vt.

BIRDS OF MAINE

is the latest and most complete work on northeastern bird life. It is an illustrated work of 693 pages and contains descriptions of the plumage and full accounts of the nests, eggs, habits and general home life of 327 species of birds. As a book for the amateur or for the scientific student of bird life in northeastern America it is unexcelled. Sent prepaid on receipt of price, $3.50. Address all orders to

ORA WILLIS KNIGHT, 84 Forest Avenue, Bangor, Maine.

CAMBRIDGE BOTANICAL SUPPLY COMPANY,

WAVERLEY, MASS.

BOTANICAL SUPPLIES OF EVERY DESCRIPTION.

Samples of Driers and Mounting Papers sent on request.
ASK FOR NEW CATALOG, NO. 91.

STANDARD MATERIAL. IMMEDIATE SHIPMENT.

Physiological Instruments. How do Plants Work?

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB.

Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS
MERRITT LYNDON FERNALD } Associate Editors.
HOLLIS WEBSTER

WILLIAM PENN RICH
EDWARD LOTHROP RAND } Publication Committee.

Vol. 11. August, 1909. No. 128.

CONTENTS:

On Balls of Vegetable Matter (Second Article). *W. F. Ganong* 149

A Color Form of Potentilla pumila. *C. A. Weatherby* . . 152

Notes on Monotropsis odorata. *C. C. Plitt* 153

Ranges of certain Junci Poiophylli. *H. H. Bartlett* . . . 155

Salix pedicellaris and its Variations. *M. L. Fernald* . . 157

Hairy-fruited Rhus Toxicodendron. *A. H. Moore* . . . 162

Viola pallens with pure white Petals. *L. R. Perkins* . . 164

Juncus articulatus, var. nigritellus in Maine. *M. L. Fernald* . 164

Boston, Mass.
1052 Exchange Building.

Providence, R. I.
Preston and Rounds Co.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price $1.00 per year ($1.25 to all foreign countries including Canada); single copies 15 cents. Volume 1, $2.00, Vol. 2, $1.50. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

B. L. ROBINSON, 3 Clement Circle, Cambridge, Mass.

Subscriptions, advertisements, and business communications to

W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

Single copies may be had from

E. L. RAND, Corresponding Sec'y N. E. Botanical Club,

1052 Exchange Building, Boston, Mass.

Entered at Boston, Mass., Post office as Second Class Mail Matter

---

SYNOPTICAL FLORA OF NORTH AMERICA, by A. GRAY and others. Vol. I. Fascicles 1 and 2. A critical treatment of forty-five families of polypetalæ (*Ranunculaceæ to Polygalaceæ*) 1895-1897. $5.20.—GRAY HERBARIUM of Harvard University, Cambridge, Mass.

KEY TO NEW ENGLAND TREES, Wild and Commonly Cultivated, based primarily upon leaf characters, by J. FRANKLIN COLLINS and HOWARD W. PRESTON. Price 40c. net. PRESTON & ROUNDS CO., Providence, R. I.

WASHINGTON'S FLORA.

A few complete sets and some incomplete ones of my Fascicle XII of Washington Plants are still on hand; also specimens of many species distributed in earlier fascicles. Send for lists.

W. N. SUKSDORF - - Bingen, Wash., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collectors' memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3-4 in. 1 year $4.00, 6 months $2.50.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 11. August, 1909. No. 128.

ON BALLS OF VEGETABLE MATTER FROM SANDY SHORES.

(Second Article).

W. F. Ganong.

In this Journal for March, 1905 (**7**, 41–47), I gave such data as I had been able to collect concerning the occurrence, composition and mode of formation of those somewhat interesting, even though not very important, objects described by the title to this paper. Since that article was published some additional facts have come to my knowledge, and are presented herewith.

In the first place, even before the publication of the former article, Professor Farlow, in response to a question of mine, had written me that such balls occur on the French shores of the Mediterranean. But for some reason or other, probably because his communication happened to fall upon the blind spot which our intellects as well as our eyes seem to possess, I did not understand that these marine balls are homologous in origin with the kind I was describing from freshwater lakes, and accordingly I failed to include them with the latter. But since then I have been able, by aid of notes kindly sent me by Professor Farlow and by Mr. F. S. Collins, to trace out the subject with some completeness, with results which, in so far as they concern our present subject, are as follows. Balls of vegetable matter formed by action of the waves upon sandy shores, both of lakes and the sea, are known in Europe, and from early times have been called *Aegagropila* by naturalists. The best known of these balls are those found on the French shores of the Mediterranean, where they are known as *Aegagropiles de mer*, or *Aegagropiles marines*, or *Pelotes marines*.

Under the supposition that all such balls were of similar origin and of algal nature, they were included in an algal genus *Aegagropila*, which comprised also some fresh-water confervoid Algae of a radiating-globular mode of growth. The real nature of the *Aegagropiles marines* was apparently first pointed out in print by Weddell in 1879. He showed that they are not Algae at all, but principally the fringed-out and balled up fibrovascular bundles of *Posidonia Caulini*, a naiadaceous phanerogam (*Actes du Congrès international de botanistes, d'horticulteurs, de négociants et de fabricants de produits du règne végétal, tenu à Amsterdam, en 1879*, 58–61; as abstracted in *Just's Jahresbericht*, **9**, 1879, 333). But Professor Farlow tells me that their real nature was understood before this, for in 1872 he collected specimens at Antibes, France (one of which is now in the Botanical Museum of Harvard University), and their formation from *Posidonia* was then known to the botanists of that place. A different explanation of the materials of which they are mainly composed was given in 1892 by W. Russell, who stated that they consist chiefly of the remains of pine cones (*Revue générale de Botanique*, **4**, 1892, 545). This conclusion was denied by Sauvageau, who again pointed out their composition from *Posidonia* bundles (*Journal de Botanique*, **7**, 1893, 34, 95). In the meantime, however, Russell had published a second article, repeating his statement about the pine cones, and giving a classification of the various materials composing such balls, both from fresh and from salt water, so far as known to him. He finds that, in addition to the pine-cone kind, some do consist of *Posidonia* with or without Algae and sponge remains, some of *Zostera*, some (in English lakes) of larch cones, some (in the lakes of the Engadine) of fir cones and fir needles, some (in the Lake of Geneva) of wood shavings. (*Revue générale de Botanique*, **5**, 1893, 65, as abstracted in *Beihefte zum botanischen Centralblatt*, **3**, 1893, 444). This list, by the way, has much interest in connection with that given for American balls in my first article. Russell was in error as to the pine cones, and the *Aegagropiles marines* are now universally known to consist mainly of *Posidonia*, and they are thus described under that genus in Engler and Prantl's *Die natürlichen Pflanzenfamilien*, II, 1, 207. The distinction between the algal and the "kunstliche" Aegagrophila is also well brought out by G. de Lagerheim in *Nova Notisaria* 1892, Ser. III, 89.

But other marine balls, of very different materials, have recently been reported from another direction. Under the title "Water-Rolled

Weed-Balls," Dr. A. H. MacKay describes fully, with photo-illustrations, some typical balls from the coast of Nova Soctia, and finds them composed of Algae, mainly *Dictyosiphon, Desmarestia, Ectocarpus, Chordaria,* and *Chorda,* with some other accessory materials (*Proceedings and Transactions of the Nova Scotian Institute of Science,* **11,** part 4, 1908, 667). Professor Farlow writes me that such balls occur also on the coast of New England.

I find also, by the way, that in the former article I did not do justice to one of the references given by J. Adams in *Science* (**19,** 1904, 926); for his note clearly points to the occurrence of the balls in a lake of the Hebrides. Another, material unstated, is reported from a Nova Scotia lake by Dr. MacKay in the article above cited. And Professor Barrows, in the letter next to be quoted, mentions the occurrence of balls composed of tamarack leaves, in a lake in Oakland County, Michigan.

Finally another, and very different, composition for balls of exactly similar mode of formation has been communicated to me by Professor Walter B. Barrows of the Michigan Agricultural College, along with several specimens. The balls are composed almost wholly of hair, and their origin is thus described in Professor Barrows' letter (of Oct. 7, 1908).

The hair comes from a tannery located on the shore of Lake Michigan, a mile or two north of Petoskey, at a point called Kegomic, and these hair balls are cast up on the beach about a mile further along, although a few are found at other places around the bay. This beach forms the easternmost point of Little Traverse Bay and receives the full force of the westerly and southwesterly winds, so that there is often a rather heavy surf on the beach. The hair balls are of all sizes up to at least five inches in diameter, although my recollection is that balls of that size are much less common than smaller ones. The shape also is quite variable but there seems to be a marked tendency towards elliptical outlines, so that the smaller ones often resemble cocoons quite closely. I am told by people living at Harbor Springs and at Petoskey that these hair balls have been a constant feature of the beach for fifteen or twenty years past, and presumably ever since the tannery was started.

The wave-formed balls, therefore, occur in the sea as well as the lakes of fresh water, and they are made up of the most diverse materials. The one feature they have in common is their mode of formation, which depends upon the rolling action of the submersed parts of waves working upon fibrous substances resting lightly upon sandy bottoms.

They are, of course, of all degrees of perfection, from loose aggregations of miscellaneous materials, familiar enough on all beaches and attracting no notice, up to those perfectly rounded forms whose symmetry and smoothness of outline compel attention and demand explanation; and it is these more perfect forms which are the subject of these two articles. Probably they occur, in suitable places, all over the globe, and, after all, the most curious thing about them is the fact that they are seemingly so little known, and so rarely mentioned, in botanical literature.

Smith College, Northampton, Mass.

A COLOR FORM OF POTENTILLA PUMILA.

C. A. Weatherby.

There is a place in the outskirts of Cambridge which, partly because of its interesting indigenous plants and partly because of certain dumping grounds in its vicinity, well repays the botanist for an occasional inspection. In the course of a recent visit to this spot, Professor Fernald and the writer noticed a peculiar and very pretty *Potentilla*, which, on examination, proved to be a form of *P. pumila* Poir. with cream-colored petals. There were forty or fifty vigorous plants of it, chiefly in a dense central colony, but with outlying individuals scattered over a space some fifty feet in diameter. With their pale petals, they contrasted strongly with the typical *Potentilla pumila* which grew abundantly about and intermingled with them. No intergradients between the two forms were observed.

The pale-flowered plant differs from typical material of *P. pumila* only in the color of its petals. It apparently represents a variation analogous to the color forms of *Gratiola aurea* recently described by Mr. H. H. Bartlett in Rhodora [**9**: 122]. No white-flowered *Potentilla pumila* to correspond with Mr. Bartlett's forma *leucantha* has, indeed, been recorded, so far as the present writer is aware; but the color-relation between typical *P. pumila* and its pale-flowered variant and that between *Gratiola aurea* and its forma *helveola* are rather strikingly similar.

A somewhat careful search has failed to disclose any previous record of color forms either of *Potentilla pumila* or of the closely allied *P. canadensis.* Poiret, indeed, in his original description,[1] speaks of the flowers of *P. pumila* as pale yellow, "jaune pâle"; but it seems hardly possible that he can have had the form with cream-colored petals before him. The absence of any record of it and its probable character as a "retrograde variety" would indicate that it is unusual and not likely to have been collected and sent to Europe as early as 1800. Moreover, Poiret is contrasting his plant with the European *P. verna* L. from which, he says, "cette espèce....me paroît devoir être distinguée" and which has deep golden-yellow flowers. In contrast with them, the clear yellow of *P. pumila* might very naturally be spoken of as pale. In a similar manner, the latest monographer of the genus *Potentilla*, Wolf,[2] uses the Latin phrase "pallide flavis" to describe the petals of a form to which a moment later, he refers as "hellgelb."

It seems desirable that the Cambridge plant should be recorded under a definite name: it may, then, be called: —

Potentilla pumila Poir., forma **ochroleuca** f. nov.

A forma typica differt petalis albo-flavescentibus.

Roadside in dry, gravelly soil: Cambridge, Mass., May 26, 1909. *M. L. Fernald* and *C. A. Weatherby.*

Gray Herbarium.

NOTES ON MONOTROPSIS ODORATA.

Charles C. Plitt.

It was by a mere accident that I first became acquainted with *Monotropsis odorata*, for it was while collecting some leaf mold that I uncovered a nice lot of this interesting little plant. This was more than fifteen years ago; since then I have seen it many times and possibly in all of its various habitats. My first find was made in low chestnut woods, but it is in the sandy pine woods where it seems to be most at home. Like the other plants of the *Monotropoideae* or Indian Pipe Subfamily, it is entirely destitute of green foliage. Its clustered stems,

[1] Encycl. Meth. Bot. 5: 594. [2] Monographie der Gattung Potentilla, 591.

seldom more than three or four inches in height, are purplish brown in color, and clothed with scale-like scarious bracts of a bright brown color, very closely resembling the dry pine needles in which and under which it delights to grow. The flowers are light rose-purple, of a most delightful fragrance, clover-like, I should say, perfuming the air for some distance around. Even in drying, the plant retains its odor for a considerable length of time.

It comes into bloom, possibly the earliest of any of the plants of its kind, being found generally in full bloom during the first week of April. It was not long after finding the plant, that I learned how it was possible for it to bloom so early, when, two or three years later, while gathering chestnuts, I found a nice clump of the plant with blossoms already apparently fully developed, seemingly only awaiting a few warm days to open.

Last year, a botanical friend announced to me, what he considered a most important discovery: — he had discovered that the fruit of *Monotropsis* was not a capsule, as stated by Gray, but a berry, and that it ripened in the fall. I had never seen the fruit so was not well prepared to attack the assertion, especially, as he insisted that he knew what he was talking about, and while neither of us had specimens to prove our assertions; however, I was sure that what he saw was the fully developed flower buds for the coming spring, and awaited with impatience the fruiting of the plant this year. Thanks to wishing to supply a friend with specimens of the fruit, I kept the task in mind, and six weeks after the first flowers appeared, found still a few withered up fruit stalks with capsules already dehisced.

From the above, I should advise that searchers for *Monotropsis* look for the plant during the early part of April, especially in pine woods. One of its companion plants is *Monotropa Hypopitys.* It is no doubt most abundant in our Coastal Plain, but can also be found farther inland in the Piedmont region in mixed woods, most generally under chestnuts. Four or five weeks later the fruit is ripe. Search in the same localities in early fall will reveal the plant with flower buds quite developed, which no doubt accounts for its early blooming the following spring.

Baltimore, Maryland.

THE GEOGRAPHIC RANGES OF CERTAIN JUNCI POIOPHYLLI.

HARLEY HARRIS BARTLETT.

JUNCUS VASEYI Engelm. The most recent statement of the range of this species (Gray's Manual, Ed. 7) is "northern New Brunswick to Saskatchewan, south to central Maine, northern New York, Michigan, Illinois, Iowa, and Colorado." The two following stations extend this range well to the northward of Bourgeau's station "on the Saskatchewan": — Keewatin; between Echimamash River and Oxford House, July, 1880, *Robert Bell.* (Upon this collection are based the records of *Juncus tenuis* Willd. in Report Geol. Surv. Canada, 1879–80, p. 65c and in Macoun, Catalogue of Canadian Plants, iv. p. 59). Athabasca; North of Peace River, 5 July, 1903, *J. M. Macoun 61281* (distributed as *Juncus Dudleyi* Wiegand).

JUNCUS DUDLEYI Wiegand. The range given for this species in the Manual, "Quebec to Saskatchewan and the Rocky Mountains," *etc.*, should be extended to include Washington. *Juncus Dudleyi* was recorded from this state by Wiegand in Bull. Torr. Bot. Club, xxx. (1903) p. 446, but Piper did not include it in his Flora of Washington. I have seen the following specimens: — from various stations in Klickitat Co., *Suksdorf 1043, 2523, 3232, 3273, 5052, 5053, 6224, & 6225*; Cape Horn, Skamania Co., 19 Aug. 1894, *Suksdorf 3594*; Latah Creek, Spokane Co., 28 June, 1889, *Suksdorf 1043.*

JUNCUS INTERIOR Wiegand. Washington should be included in the range of this prairie type, on the basis of a specimen from Prosser, Yakima Co., *Cotton 647* (distributed as *Juncus tenuis* and cited under this name in the Flora of Washington).

JUNCUS BRACHYPHYLLUS Wiegand. This species is known from New Mexico (*v. infra*), the region of the upper Platte (western Nebraska, northern Colorado, or Wyoming), Idaho, Oregon, and Washington. The extension of its range into the two latter states is based upon beautiful specimens received for determination from Mr. Suksdorf, and upon other specimens which were unidentified or incorrectly identified when received at the Gray Herbarium. These are: — Oregon: Hood River Valley, Wasco Co., *Suksdorf 210 & 215.* Washington: moist hillsides, Blue Mountains, Columbia Co., *Horner*

R198B497; wet places and damp cliffs near Bingen, Klickitat Co., *Suksdorf 3817, 6221 & 6231*.

Dropping Arkansas from the range of this species requires a word of explanation. In his first paper on the *Juncus tenuis* allies (Bull. Torr. Bot. Club, xxvii. (1900) p. 520), Wiegand cited the three specimens from which he drew up the original description of *Juncus brachyphyllus* as follows: —

> "Arkansas: (Between Morka and Red Fork) (Marcy's Exped. Herb. G. Thurber); Upper Platte (Hayden in Gray Herb. type.)
>
> Idaho: (Lake Waha) (Heller, no. 3410, 1896)."

Both of the specimens said to be from Arkansas are in the Gray Herbarium. The original label of the former reads, "Between Moska and red fork Ark. June–Sept. 1849." A supplementary label, dating from the time that the Thurber collection was incorporated with the Gray Herbarium, ascribes the specimen to "Marcy's Expedition." When the itinerary of the Marcy Expedition of 1849 was looked up (The Report of Capt. R. B. Marcy's Route from Fort Smith to Santa Fe, 31st Congress, 1st Session [Senate] Ex. Doc. no. 64 (1850) p. 169), it was found that the expedition, which started from Fort Smith on the fifth of April, arrived at Santa Fe, New Mexico, on the twenty-eighth of June and that the return trip to Fort Smith was begun about the twenty-fifth of August. The line of march on the return was southward to Dona Ana on the Rio Grande, and from there in general eastward and southeastward, until, eight days after crossing the Pecos River, they "pushed out upon the high plain of the Llano Estacado." This was on the twenty-ninth of September. On October sixth they "struck into a creek bottom, followed it down about three miles to its junction with a large stream, which is the main Red Fork of the Colorado.....The main Rio Colorado has, near its head, two principal tributaries — the Concho and the Red Fork." There can be no doubt that this is the Red Fork of the Marcy label. It remains to identify his "Moska." The name is not mentioned in his report nor is it on his map. So far as there is any evidence, however, it seems to have been the name of his camp near Santa Fe, for on U. S. Land Office maps of later date a tract about ten miles northeast of Santa Fe is called "Sierra Mosca." This was afterwards the site of Fort Marcy. It would seem likely, from the montane and northern distribution of *Juncus brachyphyllus*, that the Marcy speci-

men was collected in the mountainous region about Santa Fe, where the expedition encamped for several weeks, or at least within the present limits of New Mexico, rather than in the desert region of northwestern Texas, through which the route lay after the ninth of September.

The second "Arkansas" station cited in Wiegand's paper is, of course, erroneous also. The Hayden specimen from the upper Platte must have been collected in western Nebraska, northern Colorado or Wyoming. If any herbarium contains a dated duplicate of the specimen in the Gray Herbarium, it might perhaps be accurately localized by referring to the lists published in several volumes of the Reports of the Hayden Survey. Since the specimen is the type of the species, this would be well worth while.

It is unfortunate that these geographical slips should have been perpetuated by Buchenau (Pflanzenreich, iv. **36**, p. 120), in a manner which affords no clue to correcting them,— "Bis jetzt nur bekannt aus Arkansas (Marcy, Hayden) und Idaho (Heller n. 3410)."

CAMBRIDGE, MASSACHUSETTS.

SALIX PEDICELLARIS AND ITS VARIATIONS.

M. L. FERNALD.

THE attractive bog willow, which for several decades passed in America as *Salix pedicellaris* Pursh, was considered by Tuckerman [1] to be identical with the European *S. myrtilloides* L., although with the concessions that "the Lapland plant is less inclined to be glaucous" and is "distinguished by the broad, often cordate base of the leaves, a habit which I have never observed in ours"; [1] and with the further comments that "Fries truly calls it elegant; noticing also, as does Wahlenberg, its resemblance in habit to Vaccinium uliginosum. It being a very northern and remarkably broad-leaved state of the species, which suggests this comparison, it is not surprising that our much larger and narrower-leaved form should not so well compare with our exclusively alpine and small-leaved form of the Vaccinium. Fries remarks upon S. myrtilloides, that its leaves do not easily blacken in drying: this is also true of our plant, which preserves all its beauty in

[1] Tuckerm., Am. Jour. Sci. xlv. 34 (1843).

the herbarium."[1] In spite of the differences of foliage indicated by Tuckerman, the American and European plants certainly simulate one another strongly; and Tuckerman, as above noted, was inclined to give little weight to the slight differences he detected and to call the plants identical, especially since he observed no differences in the aments and since Koch had stated of the European plant "foliorum forma valde variabilis, occurrunt scil. subrotundo-ovata, basi subcordata apice obtusissima, ovata, oblonga, acuminata, et lanceolata utrinque acuta."[2] The conclusions of Tuckerman, however, were not accepted by Torrey who said of *S. pedicellaris* "a low, very distinct and neat species, which my friend Mr. Tuckerman thinks is not distinct from *S. myrtilloides*, Linn., but I am not yet satisfied that they are the same";[3] nor by Carey in his treatment of *Salix* in the first four editions of Gray's Manual. But in 1858 they were taken up without perfect confidence by Andersson,[4] and in the fifth edition of Gray's Manual (in 1867) the shrub, which up to that time had been generally known in America as *S. pedicellaris* Pursh, was treated as *S. myrtilloides* L. In 1865, however, Andersson[5] indicated very clearly that he could not accept Tuckerman's view and treated the American *S. pedicellaris* as subspecifically separable from the European *S. myrtilloides*; and in the Prodromus[6] he later kept it apart as an American variety.

In the sixth edition of Gray's Manual, Bebb took the name *Salix myrtilloides* for the commonest tendency of the American plant, with elliptic-obovate leaves, and set off as var. *pedicellaris* a shrub with "leaves oblong-linear or oblanceolate," which, as we shall later see, could hardly have been the plant originally described by Pursh as *S. pedicellaris*.

In preparing the manuscript for the seventh edition of Gray's Manual it seemed best to restore to the American plant its earlier status as a species, *S. pedicellaris*, distinct from the Old World *S. myrtilloides*. The reasons for so doing may be briefly stated as follows. The American shrub is stouter and generally taller than the European, with nearly erect scattered branches; the short branches of *S. myrtil-*

[1] Tuckerm., Am. Jour. Sci. xlv. 34 (1843).
[2] Koch, De Salic. Eur. Comm. 52 (1828).
[3] Torr. Fl. N. Y. ii. 213 (1843).
[4] Anderss. Sal. Bor.-Am. 20 (1858).
[5] Anderss. Mon. Sal. 96 (1865).
[6] Anderss. in DC. Prodr. xvi. pt. 2, 230 (1868).

loides being numerous and divergent. The leaves of the American shrub, varying from obovate-oblong to linear-oblanceolate (broadest above the middle), tapering to an acutish base, and usually glabrous from the first, are in maturity 3–8 cm. long; those of true *S. myrtilloides* of Europe, varying from round-ovate to ovate-oblong or oblong-lanceolate (broadest near the base), rounded or subcordate at base, and silky beneath when young, are in maturity only 1.5–3.5 cm. long. The American plant has larger aments and larger capsules, which are on pedicels 2–4 mm. long; the smaller capsules of the European plant being borne on pedicels 1–2 mm. long. *S. myrtilloides* is a shrub of arctic-alpine and high-northern distribution;[1] but the American *S. pedicellaris* is unknown from our colder regions, reaching its northeastern limit in the St. Lawrence valley and having its great development in the boggy meadows of the northern United States and adjacent Canada. In its geographic range *S. pedicellaris* is thus to be classed with *Andromeda glaucophylla*,[2] which replaces in our bogs of temperate North America the hyperboreal *A. polifolia*.

This American species, *Salix pedicellaris*, has three pronounced variations. The commonest, and in some ways the most attractive, is the shrub with the obovate-oblong blunt or acutish leaves very glaucous beneath, those of the vegetative shoots becoming 1–2.5 cm. broad. This, the shrub called by Bebb in the sixth edition of Gray's Manual *S. myrtilloides*, has the capsules rather plump and bluntish, and it is widely distributed in sphagnous bogs or wet meadows from eastern Quebec to British Columbia, south to New Jersey, Pennsylvania, Illinois, and Iowa.

Another variation, similar in foliage and in capsules to the commonest tendency of the species, differs rather strikingly in having the leaves deep green upon both surfaces, only the very youngest, if any of them, glaucescent. This green-leaved shrub is apparently not common, the specimens before the writer coming from a few scattered stations — in Quebec, Vermont, New York, British Columbia, and Washington.

[1] *Salix myrtilloides* of northern Europe has been reported as occurring in northwestern arctic America, although Andersson qualifies his report by saying "sed ibi saepe cum aliis speciebus valde confusa" (Anderss. in DC. Prodr. xvi. pt. 2, 229). The writer has seen no American material which satisfactorily matches the European, but *S. fuscescens* Anderss. of Alaska and of Mt. Albert, Quebec, strongly resembles it. *S. fuscescens*, however, has the leaves broadest above the middle, much as in *S. pedicellaris*, and the large capsules are on very short pedicels (shorter than the scales).

[2] See Rhodora, v. 67–71 (1903).

The third variety is a little shrub, apparently as rare as the green-leaved plant, with the leaves very glaucous beneath but oblanceolate to linear-oblong, acute or subacuminate, and mostly less than 1 cm. broad. As it occurs in bogs along the Concord River in Bedford, Massachusetts, this narrow-leaved plant is recognized at some distance not only by its foliage but by the more slender and more prominently beaked capsules, which give the aments a looser appearance than is ordinary in the commoner variety. On the Concord meadows it occurs in small colonies by itself, often in wetter places than the other, but occasional shrubs present tendencies transitional to the common variety with obovate-oblong leaves and plumper blunter capsules. The narrow-leaved extreme is the plant obviously intended by Bebb as *Salix myrtilloides*, var. *pedicellaris* with "leaves oblong-linear or oblanceolate" and it seems to have formed a small part of Andersson's *S. myrtilloides, β. pedicellaris.* But in order to determine whether we are justified in applying the name *pedicellaris* to a plant with "oblong-linear or oblanceolate" leaves, which are very glaucous beneath, and with slender subulate capsules it is necessary to examine Pursh's original description of *S. pedicellaris.* This was as follows:

"13. S. ramulis laevigatis, foliis obovato-lanceolatis acutis integerrimis utrinque glabris concoloribus, stipulis nullis, amentis coaetaneis pedunculatis glaberrimis, squamis oblongis pedicello duplo brevioribus vix pilosis, germinibus ovato-oblongis longissime pedicellatis glabris, stigmatibus sessilibus bifidis. *pedicellaris.*

S. pensylvanica *Hortul.*

On the Catskill mountains, New York. ♄. April. *v. v.* This elegant and singular species flowered in the garden of G. Anderson, Esq., from a plant brought by me from America. He has one through another channel, which appears to be the male to this species." [1]

From this original description it can hardly be questioned that Pursh's *Salix pedicellaris*, with obovate-lanceolate leaves green on both sides and "germinibus ovato-oblongis" is the rare shrub noted above as the second variety. The two shrubs with the leaves glaucous beneath, both of which have been at times referred to *S. pedicellaris*, seem to have had no names which can be taken up for them and are here proposed as new varieties. The characteristics and bibliographic history of these three variations of *S. pedicellaris* are as follows.

[1] Pursh, Fl. Am. Sept. ii. 611 (1814).

Salix pedicellaris Pursh. Small subsimple or loosely branching shrub: branchlets elongate, strongly ascending: leaves obovate-oblong to broadly oblanceolate, obtuse or acutish at tip, acutish at base, green on both surfaces, glabrous from the first; in maturity subcoriaceous, 2.5–5 cm. long, 1–2 cm. broad: fertile aments thick-cylindric, on leafy peduncles: capsules reddish or yellowish, ovoid at base, tapering gradually to the thick blunt beak: pedicels 2–4 mm. long, twice exceeding the smoothish yellow scale: nectary about 1 mm. long.— Fl. Am. Sept. ii. 611 (1814); Eaton, Man. ed. 2, 415 (1818); Torr. Compend. 366 (1826) and Fl. N. Y. ii. 212, t. 120 (1843); Beck, Bot. N. & Mid. States, 319 (1833); Hook. Fl. Bor.-Am. ii. 150 (1839); Carey in Gray, Man. 429 (1848), in part; Robinson & Fernald in Gray, Man. ed. 7, 324, fig. 655 (1908), in part. *S. myrtilloides* Tuckerm. Am. Jour. Sci. xlv. 34 (1843); Anderss. Sal. Bor.-Am. 20 (1858); Gray, Man. ed. 5, 465 (1867); Britton in Britton & Brown, Ill. Fl. i. 505, fig. 1204 (1896); in part, not L. *S. myrtilloides*, subsp. *S. pedicellaris* Anderss. Mon. Sal. 96 (1865), in part. *S. myrtilloides, β. pedicellaris* Anderss. in DC. Prodr. xvi. pt. 2, 230 (1868), in part.— Originally collected by Pursh in the Catskill Mts., New York. Specimens examined from Quebec, boggy shores of alpine ponds, Table-top Mt., Gaspé Co., August 4, 1906 (*Fernald & Collins*, no. 494): Vermont, Bristol bog, June 12, 1898 (*W. W. Eggleston & A. C. Dyke*, no. 360): New York, western part of the state (*Asa Gray*): British Columbia, Telegraph Trail, latitude 54°, June 2, 1875 (*J. Macoun*, no. 1658): Washington, White Salmon, 1879 (*W. N. Suksdorf*).

Var. **hypoglauca**, n. var., foliis obovato-oblongis vel late oblanceolatis apice obtusis vel subacutis basi acutis vel subacutis supra viridibus subtus glaucis, junioribus rufescentibus tenuibus glabris, demum subcoriaceis 3–8 cm. longis 1–2.5 cm. latis; amentis femineis subdensifloris fructiferis 2–3.5 cm. longis 1.5–2 cm. crassis, rhachi 1–2 mm. crassa; capsulis purpurascentibus vel flavescentibus 5–8 mm. longis basi ovoideis crassiusculis apice obtusis.— Leaves obovate-oblong or broadly oblanceolate, obtuse or subacute, acute or subacute at base, green above, glaucous beneath; the young reddish, thin, glabrous; the mature subcoriaceous, 3–8 cm. long, 1–2.5 cm. broad: pistillate aments rather densely flowered, in fruit 2–3.5 cm. long, 1.5–2 cm. thick; the rhachis 1–2 mm. thick: capsules purplish or yellowish, 5–8 mm. long, ovoid and thickish at base, obtuse at tip.— *S. pedicellaris* Auth. in part, not Pursh. *S. myrtilloides* Auth. in part, not L.— Sphagnous bogs and wet meadows from eastern Quebec to British Columbia, south to New Jersey, Pennsylvania, Illinois, and Iowa. Type collected in swamp at Cow Island, West Roxbury, Massachusetts, by *F. F. Forbes*, May 22 and July 20, 1905. Among the very numerous specimens examined may be cited the following. Quebec, vicinity of Montmorency Falls, June 29, 1905 (*J. Macoun*, no. 68,788): New Brunswick, open bog, Bathurst, July 25, 1902 (*Williams & Fernald*); Kent

Co., August 28, 1868 (*J. Fowler*): Maine, Larch and Arbor-Vitae swamps, St. Francis River, August 13, 1902 (*Eggleston & Fernald*); boggy margin of Chemo Stream, Bradley, July 30, 1895 (*Fernald*, no. 375): Vermont, Porter's Swamp, Colchester, May 13, 1895, June 28, 1896 (*A. J. Grout*): Massachusetts, Topsfield (*Wm. Oakes, Geo. B. Emerson*); Boxford (*J. Robinson, Faxon, Sears*); Concord River meadows, Bedford, May 27, 1906, May 23, 1909 (*Fernald*); Charles River meadows, Needham, May 6 and August 26, 1905 (*E. F. Williams*); Brookline, May 10 and 28, 1855 (*Wm. Boott*); Neponset meadows, Readville, August 23, 1892 (*E. & C. E. Faxon*): Connecticut, in sphagnum, Stafford, September 1, 1903 (*C. B. Graves*); New Haven, May 7 and June 2, 1886 (*A. L. Winton*): New York, Stony Creek Ponds, July 6, 1899 (*Rowlee, Wiegand, & Hastings*); Junius (*Sartwell*): New Jersey, Budd's Lake, June 25, 1869 (*T. C. Porter*): Ontario, Peninsula Harbor, Lake Superior, October 3, 1896 (*G. S. Miller*): Michigan, Mackinaw to Sault Ste. Marie (*Loring*): Illinois, Peoria (*F. Brendel*): Manitoba, near Sidney, June 12, 1906 (*J. Macoun & W. Herriot*, no. 70,267): British Columbia, Revelstoke, May 27, 1890 (*J. Macoun*).

Var. **tenuescens**, n. var., foliis oblanceolatis vel lineari-oblongis utrinque acutis subtus glaucis 6–10 mm. latis; amentis femineis fructiferis laxifloris, rhachi 1 mm. crassa; capsulis subulatis 7–10 mm. longis.— Leaves oblanceolate or linear-oblong, acute at both ends, glaucous beneath, 6–10 mm. wide: fruiting aments loosely flowered; rhachis 1 mm. thick: capsules subulate, 7–10 mm. long.— *S. myrtilloides, β. pedicellaris* Anderss. in DC. Prodr. xvi. pt. 2, 230 (1868) in part; Bebb in Gray Man. ed. 6, 485 (1890); Britton in Britton & Brown, Ill. Fl. i. 505 (1896); not *S. pedicellaris* Pursh.— Apparently a rare variety, of which material collected by the writer May 23, 1909, on the meadows of the Concord River, Bedford, Massachusetts, may stand as typical.

Gray Herbarium.

HAIRY-FRUITED VARIATIONS OF RHUS TOXICODENDRON.

Albert Hanford Moore.

While looking over some material of *Rhus Toxicodendron* L. at the Gray Herbarium recently, the writer noticed a very curious specimen collected by E. B. Chamberlain and G. E. Dinsmore at Bristol, Maine. The ordinary northeastern *Rhus Toxicodendron* has, as the seventh edition of Gray's Manual rightly says, "berries whitish or cream-

colored, subglobose, glabrous or nearly so," that is hairs, if present at all, which is rare, few and small. In the Bristol plant, however, there are numerous and conspicuous soft hairs, a fact which is very interesting because it is the characteristic of the fruits in most of the genus to be covered with hairs of some sort. Although a smaller berried plant with shorter hairs on the fruit occurs in Florida, which seems to be a distinct variety, if not species, among plants which can with positiveness be determined as *Rhus Toxicodendron* the present specimen seems to be altogether unique.

Rhus Toxicodendron L. f. **malacotrichocarpum** A. H. Moore, f. nov. fructu abundanter piloso.

Type Specimen: Maine: in sand growing over bushes, Pemaquid Beach, Bristol, September 9, 1898 (*E. B. Chamberlain, G. E. Dinsmore*, no. 832, in Herb. Gray).

The genus *Schmaltzia* Desv. has been recently taken up for some of the species of *Rhus*. The principal reason for doing this seems to have been the pubescent nature of the fruit. Small in his Flora of the Southeastern United States separates the genus *Rhus* from *Schmaltzia* in the key to the family *Spondiaceae* as follows:

Drupe with a glabrous outer coat: stone ribbed. 3. Rhus.
Drupe with a pubescent fruit: stone smooth. 4. Schmaltzia.

However, in the Bristol plant under discussion, as well as in the Florida plant referred to and in two specimens from Georgia collected by Mr. Harley Harris Bartlett, we have undoubted congeners of *Rhus Toxicodendron* with pubescent fruit, a fact decidedly opposed to the maintenance of *Schmaltzia* as a distinct genus on the same ground.

A modification of the poison ivy not rarely met with is a teratological form in which the flowers are replaced by tiny leaves, each trifoliolate in the usual manner. Since this plant is teratological and since it can obviously not reproduce itself sexually, it does not properly belong in the sequence of what one may term evolutionary classification; yet it seems worthy of notice and record. This abnormal development is common amongst the Krummholz of *Pinus sylvestris* L. at Wood's Hole, Massachusetts. In the herbarium of the New England Botanical Club there is a specimen of the same form from Furnace Brook, Blue Hills, August 15, 1894 (*W. H. Manning*).

Cambridge, Massachusetts.

Viola pallens with pure white Petals.— I have observed an interesting variation of *Viola pallens* here in Franklin, Mass. It occurred in a single bed about five feet in diameter, growing in the moist muck on the edge of a swamp intimately mingled with the typical *Viola pallens* in the proportion of about two hundred blossoms of the form to six hundred of the type. It differed in having all its petals pure white, without the purple lines usually characteristic of this species and its immediate allies. Careful examination revealed no difference in leaf, root, or flower, except in this one particular. This form might perhaps be called

Viola pallens (Banks) Brainerd, forma **alba** f. nov. Petalis omnino albis, non striatis.— Llewellyn R. Perkins, Franklin, Mass.

Juncus articulatus, var. nigritellus in Maine.— Among some *Junci* collected by Miss Kate Furbish in July, 1902, at Cutler, Maine, and included in her herbarium recently presented to the New England Botanical Club, is a plant obviously of close affinity to *Juncus articulatus* but with the few branches of the inflorescence stiff and erect instead of spreading. In its inflorescence the plant thus strongly simulates *J. alpinus* of our northern borders, but its perianth and capsule are distinctly those of *J. articulatus*. A study of the group shows it to be with little question the rare plant, hitherto known only from the mountains of Scotland and Scandinavia, originally described by Don as *J. nigritellus*, but by all recent botanists considered a variety of *J. articulatus*. The plant has had several varietal names but the earliest treatment of it as a variety seems to have been in 1837 when it was called *J. lampocarpus*, var. *nigritellus* (Don) Macreight, Man. Brit. Bot. 242. It is now generally agreed that the Linnean name, *J. articulatus*, must be maintained for the plant which has passed in Europe as *J. lampocarpus* Ehrh., so that the variety with strict inflorescences and very dark capsules should be called *J. articulatus* L., var. *nigritellus* (Don) Druce, Brit. Pl. 71 (1908). This variety, formerly known only from boreal Europe, is an interesting addition to the flora of the outer coast of eastern Maine, a region already notable for its boreal flora — *Elymus arenarius* L., *Eriophorum opacum* (Björnstr.) Fernald, *Carex norvegica* Willd., *Iris setosa* Pallas, var. *canadensis* Foster, *Comandra livida* Richards., *Rumex occidentalis* Watson, *Stellaria humifusa* Rottb., *Montia fontana* L., *Rubus Chamaemorus* L., *Empetrum nigrum* L., etc.— M. L. Fernald, Gray Herbarium.

Vol. 11, no. 127, including pages 125 to 148, was issued 1 July, 1909.

Gray's New Manual of Botany — 7th Edition

An illustrated flora of the Northern United States and Canada east of the 96th meridian. By ASA GRAY, LL.D., late Professor of Natural History, Harvard University. Thoroughly revised and largely rewritten by BENJAMIN LINCOLN ROBINSON, Ph.D., Asa Gray Professor of Systematic Botany, and MERRITT LYNDON FERNALD, S.B., Assistant Professor of Botany, Harvard University, assisted by specialists in certain groups. With more than nine hundred text figures.

Regular Edition. Cloth, illustrated, 8vo, 928 pages. Price, $2.50.
Tourist's Edition. Limp leather, 5×7½ inches. Price, $3.00.

AMERICAN botanists, who have been impatiently awaiting the revision of this indispensable work, will be delighted to know that a seventh, completely revised, and copiously illustrated edition, is now ready. The revision has entailed years of work by skilled specialists. No effort or expense has been spared to attain the highest degree of clearness, terseness, and accuracy. The plant families have been rearranged in a manner to show the latest view of their affinities, and hundreds of species have been added to the flora. The nomenclature has been brought into thorough accord with the important international rules recently established — a feature of great significance. Indeed, the Manual is the only work of its scope which in the matter of nomenclature is free from provincialism and rests upon a cosmopolitan basis of international agreement. Nearly a thousand figures have been added, and scores of brief and lucid keys have been introduced in a manner which greatly simplifies the problem of plant identification. The work has been extended to include Ontario, Quebec, and the maritime provinces of Canada.

AMERICAN BOOK COMPANY
New York Cincinnati Chicago Boston

HOME GROWN LILIES.

Fresh from Beds. Wild Flowers, Hardy plants of all kinds.
Send for catalogue.

F. H. HORSFORD, Charlotte, Vt.

BIRDS OF MAINE

is the latest and most complete work on northeastern bird life. It is an illustrated work of 693 pages and contains descriptions of the plumage and full accounts of the nests, eggs, habits and general home life of 327 species of birds. As a book for the amateur or for the scientific student of bird life in northeastern America it is unexcelled. Sent prepaid on receipt of price, $3.50. Address all orders to

ORA WILLIS KNIGHT, 84 Forest Avenue, Bangor, Maine.

CAMBRIDGE BOTANICAL SUPPLY COMPANY,
WAVERLEY, MASS.
BOTANICAL SUPPLIES OF EVERY DESCRIPTION.
Samples of Driers and Mounting Papers sent on request.
ASK FOR NEW CATALOG, NO. 91.
STANDARD MATERIAL. IMMEDIATE SHIPMENT.
Physiological Instruments. How do Plants Work?

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB.

Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS
MERRITT LYNDON FERNALD
HOLLIS WEBSTER
} Associate Editors.

WILLIAM PENN RICH
EDWARD LOTHROP RAND
} Publication Committee.

Vol. 11. September, 1909. No. 129.

CONTENTS:

Paracedroxylon, a new Araucarian Wood. *E. W. Sinnott* . 165

The Habitat of Rhodora. *D. P. Penhallow* 173

Color Form of Carum Carvi. *A. H. Moore* 178

Meeting of the Josselyn Society. *E. B. Chamberlain* . . 179

Habenaria dilatata, an omitted Record. 179

Fimbristylis Frankii. v. brachyactis. *M. L. Fernald* . . 180

Boston, Mass.
1052 Exchange Building.

Providence, R. I.
Preston and Rounds Co.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price $1.00 per year ($1.25 to all foreign countries including Canada); single copies 15 cents. Volume 1, $2.00, Vol. 2, $1.50. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

B. L. ROBINSON, 3 Clement Circle, Cambridge, Mass.

Subscriptions, advertisements, and business communications to

W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

Single copies may be had from

E. L. RAND, Corresponding Sec'y N. E. Botanical Club,

1052 Exchange Building, Boston, Mass.

Entered at Boston, Mass., Post office as Second Class Mail Matter

SYNOPTICAL FLORA OF NORTH AMERICA, by A. GRAY and others. Vol. I. Fascicles 1 and 2. A critical treatment of forty-five families of polypetalæ (*Ranunculaceæ to Polygalaceæ*) 1895-1897. $5.20.—GRAY HERBARIUM of Harvard University, Cambridge, Mass.

KEY TO NEW ENGLAND TREES, Wild and Commonly Cultivated, based primarily upon leaf characters, by J. FRANKLIN COLLINS and HOWARD W. PRESTON. Price 40c. net. PRESTON & ROUNDS CO., Providence, R. I.

WASHINGTON'S FLORA.

A few complete sets and some incomplete ones of my Fascicle XII of Washington Plants are still on hand; also specimens of many species distributed in earlier fascicles. Send for lists.

W. N. SUKSDORF - - Bingen, Wash., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collectors' memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3-4 in. *1 year $4.00, 6 months $2.50.*

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 11. September, 1909. No. 129

PARACEDROXYLON, A NEW TYPE OF ARAUCARIAN WOOD.[1]

EDMUND W. SINNOTT.

(Plates 80 and 81.)

PROF. J. B. WOODWORTH, of Harvard University, collected in 1906 some specimens of lignite from the clays of Second Cliff, Scituate, Massachusetts. This material was recently turned over to the writer for investigation. It consisted of several good-sized pieces, the largest of which was about 8 cm. long, 3 cm. wide and 3 cm. thick. There were also a number of smaller bits. This fossil wood was treated with 95% alcohol in a paraffin bath over night, and then left for 24 hours in a 4% solution of caustic potash in 95% alcohol. The solution was afterwards neutralized with weak hydrochloric acid. The lignite was now softened by a three days' stay in 20% hydrofluoric acid, in wax bottles. All traces of this acid were removed by leaving the material for a day under a tap of running water. The wood was now carefully dehydrated and embedded in celloidin in the usual way, after which microtome sections of it were cut.

The lignite exhibits an excellent state of preservation. Though it has been distorted somewhat by pressure, the details of its anatomy, such as the tori of the bordered pits, are still to be made out very clearly.

In the transverse section (Fig. 1), the wood is seen to be composed entirely of tracheids, traversed by thin-walled resinous medullary rays. The annual rings, in what is apparently the normal condition, are broad and not well marked, only the last few rows of cells of the

[1] Contributions from the Phanerogamic Laboratories of Harvard University, No. 18.

summer wood being noticeably smaller than the rest and having slightly thicker walls. The radial walls of the tracheids are well provided with bordered pits, and half-bordered pits occur between ray-cells and tracheids. Pits on the tangential walls appear in only the last two or three rows of the summer wood. Resin-canals and resin-parenchyma seem to be normally quite absent, though tracheids filled with resin or mucilage occur irregularly throughout the wood.

A longitudinal radial section shows the tracheids crossed by medullary rays, which vary in height from two to twelve or more cells. There are no marginal tracheids. The ray-cells have very thin walls, and are often filled with "resin," thus presenting a close resemblance to those of the modern *Araucarineae* (Fig. 2). The only pits observable are the half-bordered ones between the rays and adjacent tracheids, there being none on the horizontal and terminal walls of the ray-cells. There are from four to six lateral pits from a ray-cell to each tracheid with which it comes into contact. These pits are circular in outline, and each has an oblique, slit-like mouth. The radial pits between tracheids show clearly in this section (Fig. 4). They are rather large and have elliptical openings, which are set obliquely, those on opposite sides of the same pit thus appearing to cross one another. No cases were observed in which a tracheid had more than one row of pits. In a few places the pits are flattened somewhat by mutual contact, but in the great majority of instances they are circular in outline, though often occurring close together in long rows. A careful search was made for bars of SANIO between the pits, but in no instance were these discovered. Trabeculae were found in a few cases (Fig. 5), as were also septate tracheids. No wood-parenchyma, however, was observable, though as above remarked resin-filled tracheids occur irregularly (Fig. 6). The tangential pits on the face of the summer wood show clearly in this section.

The longitudinal tangential section shows the rays to be composed of cells with oblong cross-section, resembling those of most of the modern Conifers (Fig. 3). The very thin walls of the ray-cells are evident. Where the section passes through an annual ring, the tangential pits appear in face view. They are smaller than those on the radial walls, and sometimes occur in more than one row to a tracheid. In such cases, however, there seems to be no regular arrangement of the pits.

The structure of the normal wood is therefore very simple. A num-

ber of pieces which were examined, however, appear to have been taken from the vicinity of one or more healed wounds. In such cases, the annual rings are much narrower than normally, and rows of very thick-walled, flattened cells occur on the face of the summer wood. Here and there throughout the wounded area are distorted clusters of thin-walled cells, in rows at right angles to the rays. The structure of these cells is hard to make out, either in transverse or in longitudinal sections. They are probably parenchyma, though possibly very much modified tracheids. These groups of cells strongly suggest the clusters of parenchyma representing abortive resin-canals in certain of the *Abietineae*, notably *Tsuga*. They may possibly be open to the same interpretation.

At two places observed, there was a band of wound-tissue at the annual ring (Fig. 7). In the transverse section, this is seen to begin as a narrow strip of cells which increases in width toward the apparent position of the wound, though no piece showing the actual wound was found. The tissue is composed of very thick-walled, much-pitted parenchyma. Where the band is wide, large mucilage-filled spaces appear in it, surrounded by the parenchyma. These cavities are sometimes nearly circular in cross-section, but are more often somewhat flattened laterally. In the intervals between them, the rays cross the wound-tissue (Fig. 8).

A longitudinal radial section exhibits these mucilage-filled spaces interrupted here and there by the passage of rays across them (Fig. 9). In this region, the horizontal and often the end walls of the ray-cells are much thickened and pitted, in strong contrast to their normal condition (Fig. 10). The mucilaginous contents of the spaces is often vacuolated, and contains here and there masses of material much darker than most of it. The wound-tissue is usually bounded, next the normal wood, by rows of septate tracheids (Fig. 11).

A longitudinal tangential section through the wide part of the band of traumatic tissue, where these cavities appear, shows that they form a net-work of mucilage-spaces, separated only by the rays or groups of rays which cross them (Fig. 12). In the narrower part of the strip of wound-tissue, the cavities grow much smaller, cease to be connected, and finally disappear.

The resemblance between these cavities and traumatic resin-canals, especially when seen in cross-section, is close, and as wound structures are often abnormal and monstrous, it seems safe to infer that the

traumatic spaces in this lignite represent modified resin-canals. They appear to be intermediate between typical traumatic canals and the wound-tissue of the modern *Araucarineae*, in which canals are never formed.

One piece was observed which showed an apparent bit of wound-callus tissue, such as is formed in the wound cap of all the Conifers.

We may now discuss the probable affinities of this interesting fossil. Its general anatomy places it unquestionably among the Conifers. One of the earliest scientific classifications of the woods of this group, but one which, in its main aspects, is largely adopted by most anatomists of the present day, was put forward by Kraus (1). He divides coniferous woods into five main groups or "genera." The type *Araucarioxylon* comprises those forms in which the pits on the radial walls of the tracheids are closely adjacent and mutually flattened, and when occurring in more than one row, alternating with one another. The modern Araucarians represent this condition. All other coniferous woods, according to Kraus, possess circular, unflattened pits which, when in two rows, are opposite one another. The group *Taxoxylon*, with *Taxus* for its type, he separates on its possession of spirally thickened tracheids throughout. The genus *Pityoxylon* includes all those forms in which resin-canals are present. The remaining Conifers, which are considerably more simple in their structure, are comprised under two groups — *Cedroxylon*, represented by such forms as *Abies, Cedrus* and *Tsuga*, in which resin-parenchyma is absent or nearly so; and *Cupressoxylon* (or *Cupressinoxylon*) in which occur the numerous forms of the *Cupressineae* and *Taxodineae*, where resin-parenchyma is abundant.

According to the classification of Kraus, our fossil would clearly come under the head of *Cedroxylon*, for its pits are neither alternate nor noticeably flattened, its tracheids are not thickened spirally, and it possesses neither resin-canals nor resin-parenchyma in the normal wood.

This classification, however, has recently been altered to some extent by Gothan (2). Among other objections to the system of Kraus he remarks that as resin-parenchyma has been found rather abundantly in several of the forms commonly included under *Cedroxylon*, such as certain species of *Abies*, it does not form a good criterion for separating this type from *Cupressinoxylon*. He observes, however, that the character of the wall of the ray-cell is quite distinctive

in the two groups. In *Cedroxylon*, the horizontal and end-walls are frequently perforated by simple pits. In *Cupressinoxylon*, these pits are absent or poorly developed, and the walls of the ray-cell are consequently smooth. The criterion of the presence of wood-parenchyma can be used, according to GOTHAN, only with caution and in connection with this more distinctive character of separation. GOTHAN would certainly include our lignite under *Cupressinoxylon*, for the horizontal and end walls of the ray-cells are entirely smooth and free from pits.

Until a few years ago, the *Araucarineae* were supposed to be an isolated family, with wood-structure clearly distinct from that of the rest of the Conifers. Only recently have forms connecting the *Araucarineae* with the other Conifers been observed. In 1906, HOLLICK and JEFFREY (3), on investigating the anatomy of the Cretaceous genus *Brachyphyllum*, found it to be an undoubted Araucarian, as shown by its flattened pits and thin-walled rays, but differing from the modern members of the family in the absence of wood-parenchyma, the scarcity of alternate pitting, and the presence near wounded regions of traumatic resin-canals. In a recent memoir by these investigators (4), the name *Brachyoxylon* is given to this type of wood. It is characteristic of a number of genera, not hitherto believed to have been connected with the *Araucarineae*, which have been described by them from the Cretaceous deposits of Staten Island, New York.

In 1907, JEFFREY (5) described an interesting new fossil genus, *Araucariopitys*, which, while clearly an Araucarian conifer, approaches much more closely than does *Brachyoxylon* the structure of the *Abietineae*. It possessed deciduous shoots, thick-walled, much-pitted ray-cells, and abundant traumatic resin-canals.

In 1907, also, GOTHAN (6) described a new species of *Cedroxylon*, *C. transiens*, in which the alternating and flattened pits of the Araucarians are very often present. Wood-parenchyma occurs at the end of the year's growth, the ray-cells are thick-walled and pitted, and one "anomalous" resin-canal was observed. GOTHAN also refers to *Larix Johnseni* of SCHRÖTER, which possessed alternating pitting but numerous resin-canals.

It is instructive to look at our fossil in the light of these recent observations. As above remarked, it would ordinarily be classed as a *Cedroxylon* or a *Cupressinoxylon*. We have already noticed, however, the thin-walled and Araucarian-like structure of the rays. Such extreme thinness and smoothness of wall is very rare, if not quite ab-

sent, in any other group of Conifers except *Pinus*. The pitting, however, is not of the characteristic Araucarian type, and the traumatic resin-canals strongly suggest the *Abietineae*.

Another character, however, not striking but apparently very important, seems to place our wood unquestionably among the *Araucarineae*. Miss GERRY (7), working in this laboratory, has investigated the occurrence in the Conifers of bars of SANIO between the radial pits of the tracheid wall. She has completely failed to find these in either of the living genera *Araucaria* or *Agathis*, or in the fossil Araucarians such as *Araucarioxylon*, *Araucariopitys* and a number of forms with the *Brachyoxylon* type of wood. In *all* other living genera of the Conifers, however, and in a number of closely related fossils, including the recently described *Prepinus*, bars of SANIO were discovered. In the fossil wood here under investigation, as above noticed, they are entirely absent.

This lignite, therefore, appears to be another addition to that interesting group of Conifers on the border-line between the *Araucarineae* and the *Abietineae*, the occurrence of which seems to warrant us in believing that the families are related, and that one has probably given rise to the other. The prevalent view at present considers the *Araucarineae*, largely because of the resemblance of their pitting to that of the *Cordaites*, to be the most primitive Conifers, and the *Abietineae*, from their more complicated structure, to be the most recent members of the group. JEFFREY, however, on the testimony presented by the very primitive *Prepinus*, and on the general principle that wounds bring about reversions to more ancient structures, as well as on other evidence, believes the *Abietineae* to be the oldest Conifers. The traumatic canals of *Araucariopitys* and of the *Brachyoxylon* type, undoubted Araucarians, are explained as relics of a structure normally present in their Abietineous ancestors. Perhaps the thickened and pitted ray-cells in the traumatic tissue of the lignite here under consideration may be a reversion to the typical ray of the *Abietineae*.

Accepting the correctness of JEFFREY'S views, the phylogenetic position of our lignite seems reasonably clear. Its structure approaches that of *Brachyoxylon* more closely than it does that of anything else. In its resin-canals, it shows less resemblance to the *Abietineae* than does this fossil, though in its pitting it approaches the *Abietineae* much more closely. Perhaps the most logical explanation of its position is to consider it a member of an extinct group of the *Araucarineae* which

separated from the ancient Abietineous stock, on the line of ascent toward the *Araucarineae*, before the appearance of flattened pitting; and in which the traumatic canals have been on the whole more reduced than in *Brachyoxylon*, having progressed still farther from the condition found in the *Abietineae*.

The occurrence at Second Cliff, Scituate, of a primitive Araucarian Conifer, such as the one under investigation, is interesting in the light it throws on the age of the geological formation at this place. None of the fossils nearest in structure to our lignite, such as the widely distributed *Brachyphyllum*, and numerous others whose wood structure has been shown to be of the *Brachyoxylon* type, have ever been found in deposits more recent than the Cretaceous. It seems quite probable, therefore, that the clays of Second Cliff, the age of which have been much in doubt, may also be referred to this period. This confirms the conclusions reached by Jeffrey and Chrysler (8) with regard to Third Cliff, Scituate.

As the structure of this fossil wood is markedly different from that of anything heretofore described, it has been thought best to include it under a new genus. From its superficial resemblance to the *Cedroxylon* type, as described by Kraus, and from the place of its discovery, the name **Paracedroxylon scituatense** is proposed for it.

Summary.

1. *Paracedroxylon scituatense* is the wood of an Araucarian Conifer from the clays of Second Cliff, Scituate, Massachusetts.

2. Its normal structure consists of tracheids and medullary rays. The cells of the latter are thin-walled and pitless, except next the adjacent tracheids. The annual rings are poorly marked, and on the face of the summer wood occur tangential pits. The radial pits on the tracheid walls are in almost every case circular in outline and not flattened by mutual contact. Bars of Sanio are entirely absent.

3. In wounded regions occur groups of thin-walled cells which possibly represent abortive resin-canals.

4. Bands of traumatic tissue may also appear near wounds. These consist of very thick-walled parenchyma, usually bounded next the normal wood by septate tracheids. Where they are widest, large anastomosing mucilage-spaces appear in them. These probably

represent somewhat modified traumatic resin-canals. As the rays cross the wounded area, their cells become thick-walled and pitted.

5. *Paracedroxylon* is another primitive Araucarian, on the border line between this group and their ancestors, the primitive *Abietineae*. It probably left the ascending Araucarian line before the appearance of flattened pitting. Its traumatic canals were subsequently much reduced from the typical Abietineous condition.

6. The presence of *Paracedroxylon* in the Second Cliff clays makes it probable that they are of Cretaceous origin.

I desire to express my sincere thanks to Prof. E. C. Jeffrey for advice during the course of the work.

This investigation was carried on in the Phanerogamic Laboratories of Harvard University.

Bibliography.

1. Kraus, G., in Schimper's Traité de paléontologie végétale, Bd. V. pp. 363–385.
2. Gothan, W. Zur Anatomie lebender und fossiler Gymnospermen-Hölzer. Abhandl. der königl. preussisch. geolog. Landesanstalt. Neue Folge, Heft 44. Berlin, 1905.
3. Hollick, A. and Jeffrey, E. C. Affinities of certain Cretaceous Plant remains commonly referred to the genera Dammara and Brachyphyllum. American Naturalist, vol. XL. pp. 189–215. 1906.
4. Hollick, A. and Jeffrey, E. C. Studies of Cretaceous Coniferous remains from Kreischerville, New York. Memoirs of the New York Botanical Garden, vol. III. 1909.
5. Jeffrey, E. C. Araucariopitys, a new genus of Araucarians. Botanical Gazette, vol. XLIV., pp. 435–444, 1907.
6. Gothan, W. Die fossilen Hölzer von König Karls Land. Kungl. Svenska. Vetenskapsakademiens Handlingar, Bd. XLII. No. 10, 1907.
7. Gerry, Miss E. The distribution of the bars of Sanio in the Conifers. Annals of Botany (ined.)
8. Jeffrey, E. C. and Chrysler, M. A. On Cretaceous Pityoxyla. Botanical Gazette, vol. XLII, pp.1–15, 1906.

EXPLANATION OF PLATES 80 AND 81.

Fig. 1. Transverse section, showing the rather faintly marked annual ring. × 40.
Fig. 2. Radial section, showing structure of a typical ray. × 200.
Fig. 3. Tangential section. × 200.
Fig. 4. Radial section, showing character of bordered pits and absence of Bars of SANIO. × 500.
Fig. 5. Radial section, showing trabeculae. × 200.
Fig. 6. Radial section, showing mucilage-filled tracheids. × 120.
Fig. 7. Transverse section, showing a broad band of traumatic tissue. × 40.
Fig. 8. Transverse section, showing three of the traumatic canals, enlarged. × 120.
Fig. 9. Radial section, showing mucilage-spaces. × 40.
Fig. 10. Radial section through the traumatic tissue showing the much thickened and pitted walls of the ray-cells in this region. × 200.
Fig. 11. Tangential section through the margin of the traumatic tissue, showing septate tracheids, tangential pits, and thick-walled ray-cells. Note the beautiful preservation of the bordered pit. × 500.
Fig. 12. Tangential section through the wide part of the traumatic band, showing the anastomosing mucilage-cavities crossed by the thick-walled rays. × 40.

AN ACCOUNT OF CERTAIN NOTEWORTHY FEATURES IN THE HABITAT OF RHODORA.

D. P. PENHALLOW.

FOR the enthusiastic collector, a large amount of interest always centers in *Rhodora*, not only because it is one of the most brilliant and fascinating of our early flowers, but also because it is commonly associated with bogs, of which it is generally held to be typical. For these reasons, any deviation from its recognized habit at once attracts attention and calls for some explanation. During the present spring large areas of this species have come under notice, and in some instances the size of the shrub and its particular habitat have presented such strong deviations from what one is accustomed to, as to suggest the importance of placing the principal facts on record.

At Shelburne, New Hampshire, in the valley of the Androscoggin,

there is a characteristic bog of somewhat more than an acre in extent, known as Wheeler's Bog. The central portion is at present occupied by a perfectly clear water field, while the margin, which is extending rapidly toward the centre, and occupies about two-thirds the entire area, affords an exceedingly fine example of the *Cassandra* stage in bog development. Here and there, however, small islands have gained a slight elevation above the *Cassandra* growth and exhibit the commencement of the next stage, that of broad-leaved trees, in which the common birch is represented. All about the margin of the bog, and extending into the interior of the *Cassandra* growth, there is an abundance of *Rhodora* which attains to a height considerably above 6 dms. Owing to the inaccessible character of the bog, it was not possible to take actual measurements, but there was a very strong impression that some of the bushes must be at least 9, and possibly 12 dm. in height. The particular point I wish to emphasize is the fact that this location affords a striking illustration of the typical habitat of *Rhodora*, which is described in the manuals as inhabiting "Cool bogs."[1]

A few days later, on the occasion of a visit to St. Andrews, New Brunswick, an opportunity was afforded for the examination of certain localities there. St. Andrews is somewhat farther north than Shelburne and is in close proximity to salt water, but judging by the character of vegetation, there is reason to believe that there can be no great climatic difference between the two places and for our present purposes, they may be regarded as essentially the same.

Geologically speaking, Shelburne is to be regarded as representing a much older geological formation than St. Andrews. The surface deposits consist of drift material derived in the main from Laurentian gneisses, intrusive granites and other rocks extending into the early Palaeozoic as far as the Cambrian. To this must also be added the material derived from erosion of innumerable trap dykes which intersect the older rocks everywhere.

At St. Andrews, on the contrary, the surface structure has been derived chiefly from red sandstone, usually regarded as Devonian, with which there has been mixed to some extent, the detritus of granite and trap dykes. How far this difference in the character of the soil may be a factor, it is at present impossible to say, as no observations in that direction have been made.

[1] The latest revision of Gray's Manual specifies "swamps and moist slopes."

Within the limits of the St. Andrews peninsula, *Rhodora* is abundant and widespread, occurring under somewhat widely different conditions of exposure and moisture; and as a detailed discussion of these features is desirable, it will be most profitable to deal with each locality studied. These are:—

1. Indian Point.
2. The eastern slope back of O'Neill's slaughter house.
3. The Protestant Cemetery.
4. The eastern slope near the Algonquin hotel pumping house.

The lower end of the St. Andrews peninsula is known as Indian Point, and for our present purpose, may be regarded as embracing all that portion which lies to the south of the Canadian Pacific Railway. This area lies at a low level and is only slightly undulating. The rather thin soil rests directly upon red sandstone, and it is so slightly above high water mark that the margin suffers marked erosion under the action of winter storms and tides, to such an extent that special means are required for the protection of the road skirting the beach.

The drainage is, on the whole, good. Within the timbered area there is practically no bog land. At one or two points near the margin of the woods, soft spots are to be observed, but these dry out in early summer. Elsewhere, the floor of the forest is the same as that generally characteristic of moist woodlands, i. e. it is covered with moss, *Cornus canadensis* and the herbage usually found in such situations. Numerous roads are cut through the wooded area, and these show the best of drainage.

The open areas are occupied chiefly by grasses and sedges, with scattering growths of *Spiraea latifolia* and *Kalmia angustifolia*. Apart from a small sink hole and a shallow bog of about one acre in extent, occupied entirely by *Typha latifolia*, there is nothing within the entire area of Indian Point, which falls under the designation of bog-land.

At least three fourths of the entire area at Indian Point is occupied by a dense growth of wood. This is composed, for the greater part, of black spruce and fir, and white cedar. With these there is mingled a large amount of the common alder. The trees within this area are all small, probably not exceeding 6–8 m., but the growth is so dense as to make it very difficult for one to penetrate to the interior. The floor is level, and wherever an opening admits sunlight, it is at once occupied by *Diervilla Lonicera, Cornus canadensis* and other plants common to open woodlands.

Rhodora does not penetrate to the interior of the wood, but is confined to the margin from which it has spread into the open areas. At one place, the shrub occurs where there is a slight bogginess in spring, though it does not attain its best development. At this time — the first of June — the locality is quite dry. Following the margin of the copse specimens occur more frequently toward the drier ground, and are constantly found in association with *Cornus canadensis, Diervilla,* ferns and mosses. On the south side where there is an extended open area toward the beach the shrub has passed much beyond the trees into the open and dry ground, where it appears to be extending.

In the open area just described, the shrubs are rarely over 30–40 cm. in height. On the western side of the woods, it is more commonly 6–9 dm. high. Here, however, several shrubs were found to have a height of 12 dm., while on the southern, western and northern sides, they were considerably taller. Careful measurements showed a number at least 1.5 m. high, while in one instance 1.6 m. was the result obtained. A noteworthy feature connected with these variations, was observed in the fact that the plants were always smallest in the open, while on the edge of the wood, where sheltered by the trees, they invariably attained their greatest height and stoutest stems.

The second locality studied, lies on the eastern slope of a rather high, gravelly ridge near its southern extremity, back of O'Neill's slaughter house and just above the Canadian Pacific tracks. The soil is perfectly well drained, and shows no indication of a swampy condition at any season of the year. The area was, until very recently, occupied by the common alder. *Rhodora* shows an abundant growth over a tract about two by eight rods in extent, but scattering specimens are found over three or four acres. None of the shrubs are over 6 dm. in height, and they therefore conform to the dimensions usually assigned to the species. No other Ericaceous plants occur in the immediate vicinity.

The Protestant Cemetery lies on the summit of a high, gravelly ridge opposite Minister's Island. On the top of this ridge, and within the limits of the Cemetery, there is a slight depression occupied by a shallow bog which becomes dry in summer, and, even on the first of June, shows very little moisture. This basin is about one acre in extent. Throughout its entire area, there is a good growth of *Iris versicolor,* and indifferent specimens of *Spiraea latifolia. Osmunda cinnamomea* and *Onoclea sensibilis* are abundant about the margin.

Rhodora is sparingly developed through the central area, but about the margin it becomes abundant and thence extends in scattering groups, into the adjacent drier areas of the summit. None of the specimens are large, with little or no variation in size, and it may be said that they conform very well to the general description of one metre or less. As one leaves the Cemetery and ascends the opposite slope on the summit of which the Algonquin hotel is situated, a noteworthy growth of the shrub is encountered at the position of the pumping station. The specimens spread over an area of one or more acres. The soil in this locality is a loose sand and gravel affording perfect drainage. The vegetation consists of poorly developed grasses, mixed with mosses and an abundant growth of the mountain cranberry (*Vaccinium Vitis-idaea*, var. *minus*). On the very summit of this ridge, on a dry gravelly bank close to the roadside, there were two very fine and vigorous clumps of *Rhodora* about 6 dm. in height.

Passing in review, the facts noted, it is to be observed that no locality has yet been found in the neighborhood of St. Andrews where *Rhodora* appears to assume the typical bog habit. The only apparent exception appears in the occurrence of a single specimen on the edge of a bog near Joe's Point, on the road to the Biological Station; and in another specimen near the Canadian Pacific Station, which also grows on the edge of a small bog. On the other hand, it is of interest to note that the most frequent occurrence is in well drained areas, and this fact is consistent with the occurrence of the plant on the high edges of gravel banks in deep railway cuttings, as was frequently noted on the line of the Maine Central before reaching Vanceboro, Maine.

The distribution of this species in the bog at Shelburne, as well as its frequent occurrence under typical bog conditions through northern Maine, is ample justification for the character usually assigned to it. But, that it is not necessarily a bog plant; that it commonly occurs in areas which are not at all swampy, and that its unusual height is best displayed under the protection of small trees, are facts of interest and importance which deserve further study. As, at this writing, the foliage is but feebly developed, it is impossible to determine how the external morphological features are correlated with the environment, but it may be possible to ascertain some facts bearing upon this question at a later date.

McGill University.

A COLOR FORM OF CARUM CARVI.

Albert Hanford Moore.

In July, 1903, Prof. Arthur Stanley Pease and the writer made a short botanical excursion to northern Maine and Quebec. To those who have never been in this delightful region, it may be of interest to state that not merely the native flora, but also the introduced flora, differs very much from our own. Among the weeds common there which are not so abundant with us none are more conspicuous than *Vicia Cracca* L. and *Carum Carvi* L. The former lines the railroads with an almost solid strip of blue for long distances, while the other, which is only an occasional dooryard escape here, grows profusely in the fields and meadows and appears to take the place of our Queen Anne's Lace. The analogy to this plant seems even closer when we note that both show an occasional tendency to bear rose-tinted flowers. Dr. Millspaugh, in his Flora of West Virginia, 369 (1892), described *Daucus Carota* L. f. *rosea* Millsp. No name could be found for the rose-colored form of the Caraway, although a number of European and American floras refer to it. Lange, Haandb. Dansk Flora, ed. I, 174 (1851), describes *Carum Carvi* L. *β. atrorubens* as having purple corolla and leaf-sheaths. A figure of it in the Flora Danica shows purple flowers. I was at first uncertain whether this phase might not vary so little and so imperceptibly from the rose-colored form that the latter would not be worthy of separation. I am greatly indebted to Dr. C. H. Ostenfeld of Copenhagen for clearing my doubts on this matter. He states that the form with light rose flowers is much more common in Denmark than the other, enclosing, at the same time, some of the flowers of *Carum Carvi L.* var. *atrorubens* Lange, which prove its distinctness. He also very kindly informs me that he does not know of any name for the rose-colored form, the floras merely saying, "flowers white or rose," or only "white." It seems appropriate to supply this lack, so I subjoin the following name and diagnosis:

Carum Carvi L. f. **rhodochranthum** A. H. Moore, f. nov. floribus roseis. Type specimen: Quebec, Temiscouata County, St. Louis, July 9, 1903 (*A. H. Moore*, no. 1218, in Herb. Moore).

Cambridge, Massachusetts.

Meeting of the Josselyn Botanical Society. — The fifteenth annual meeting of the Josselyn Botanical Society of Maine was held at Peaks Island, Portland, Maine, from June 27th to July 2nd, 1909, with about twenty persons in attendance. Excursions were made to Old Orchard, Pine Point, Falmouth, Chebeag Island, and the Grand Trunk Railway yards in Portland, besides shorter trips to various parts of Peaks Island. Upon these trips many interesting species of plants were found, several being previously unknown from the region. On Tuesday evening Prof. M. L. Fernald of Cambridge addressed the Society upon the subject of "The New England Flora of the Future, or Changes in our Flora due to the Destruction of Forests," illustrating the address by specimens of the plants mentioned. On Thursday evening Prof. Fernald gave an informal talk upon some species of plants recently added to the state flora, showing specimens of the plants themselves.

The following list represents the more noteworthy species collected during the meeting. *Typha angustifolia* L., *Carex crinita* Lam., var. *gynandra* Schwein. & Torr., and var. *minor* Boott, *C. Michauxiana* Boeckl., *C. salina* Wahl., var. *cuspidata* Wahl., *Sisyrinchium gramineum* Curtis at Great Chebeag Island; *Panicum Werneri* Scribn., *Thalictrum polygamum* Muhl., var. *hebecarpum* Fernald, *Barbarea verna* Asch., *Potentilla recta* L. at Falmouth; *Carex muricata* L., *Rubus alleghaniensis* Porter, var. *calycosus* Fernald, *R. idaeus* L., *Hyoscyamus niger* L. at Peaks Island; *Oxalis stricta* L. at Pine Point; *Rumex mexicanus* Meisn., *Chenopodium leptophyllum* Nutt., *Amaranthus blitoides* Wats., *Coronopus didymus* L., *Neslia paniculata* Desv., *Tragopogon pratensis* L. at Portland.— Edward B. Chamberlain.

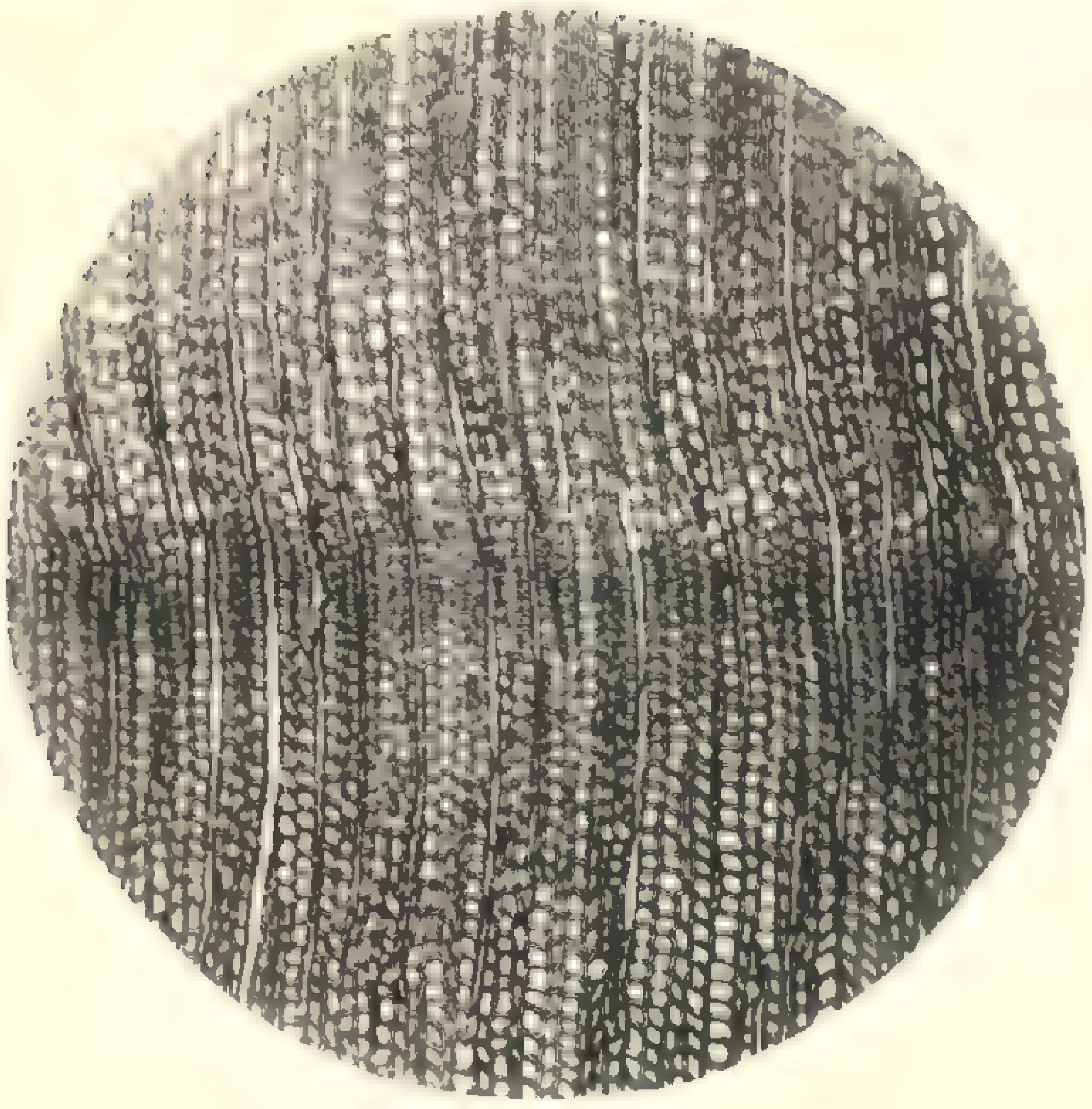
Habenaria dilatata, an omitted Record.— The following record should be added to the list of *Orchidaceae* published in Rhodora XI, 76:

Habenaria dilatata (Pursh) Gray. "A peaty meadow on left hand of road to South Reading [Wakefield], perhaps a mile from Stoneham depot" (*Wm. Boott*, no date. The specimen is in Gray Herb.); Reading and Stoneham (according to Dame & Collins, Fl. Middlesex Co., 106. 1888); Lexington (according to Baldwin, Orchids of N. E., 137. 1884).

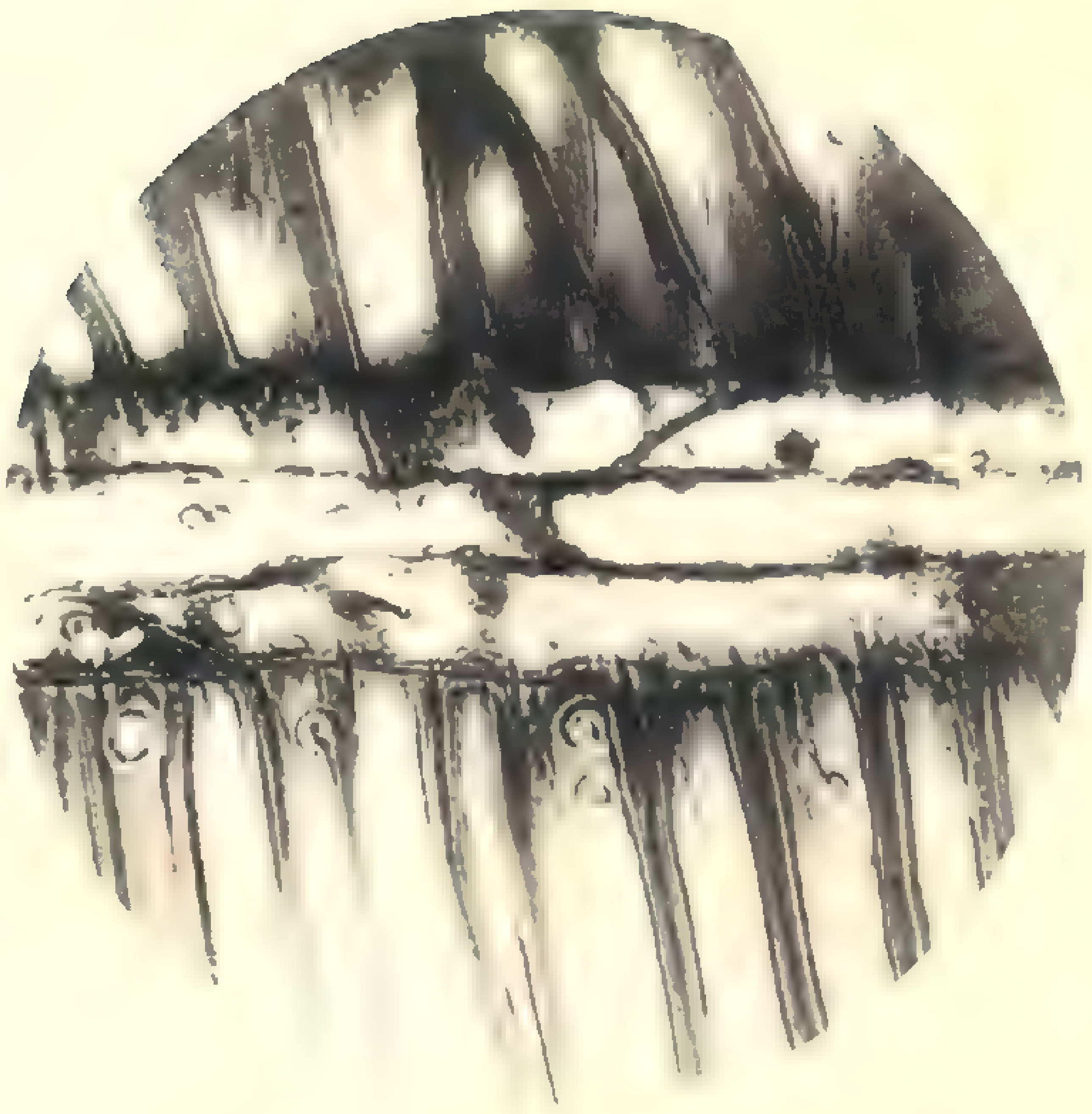
In a letter to Mr. Walter Deane, dated April 17, 1909, Mr. Oakes Ames says of this species: "*H. dilatata* is extremely rare in Massachusetts, I have only seen specimens from Middlesex Co. (Hb. Gray) and from Franklin Co. (Sunderland, in Hb. Ames)."— Local Flora Committee.

Fimbristylis Frankii Steud., var. **brachyactis**, n. var., spiculis glomerulatis.— Spikelets glomerulate; otherwise as in the species.— In hard clay soil by the Stillwater River, Orono, Maine, August 18, 1908 (*M. L. Fernald*). Closely simulating the southern *F. Vahlii* (Lam.) Link, but with the 3-cleft style and the trigonous achene exactly of *F. Frankii* which, in its ordinary form abounds in the neighborhood where the variety occurs.— M. L. Fernald, Gray Herbarium.

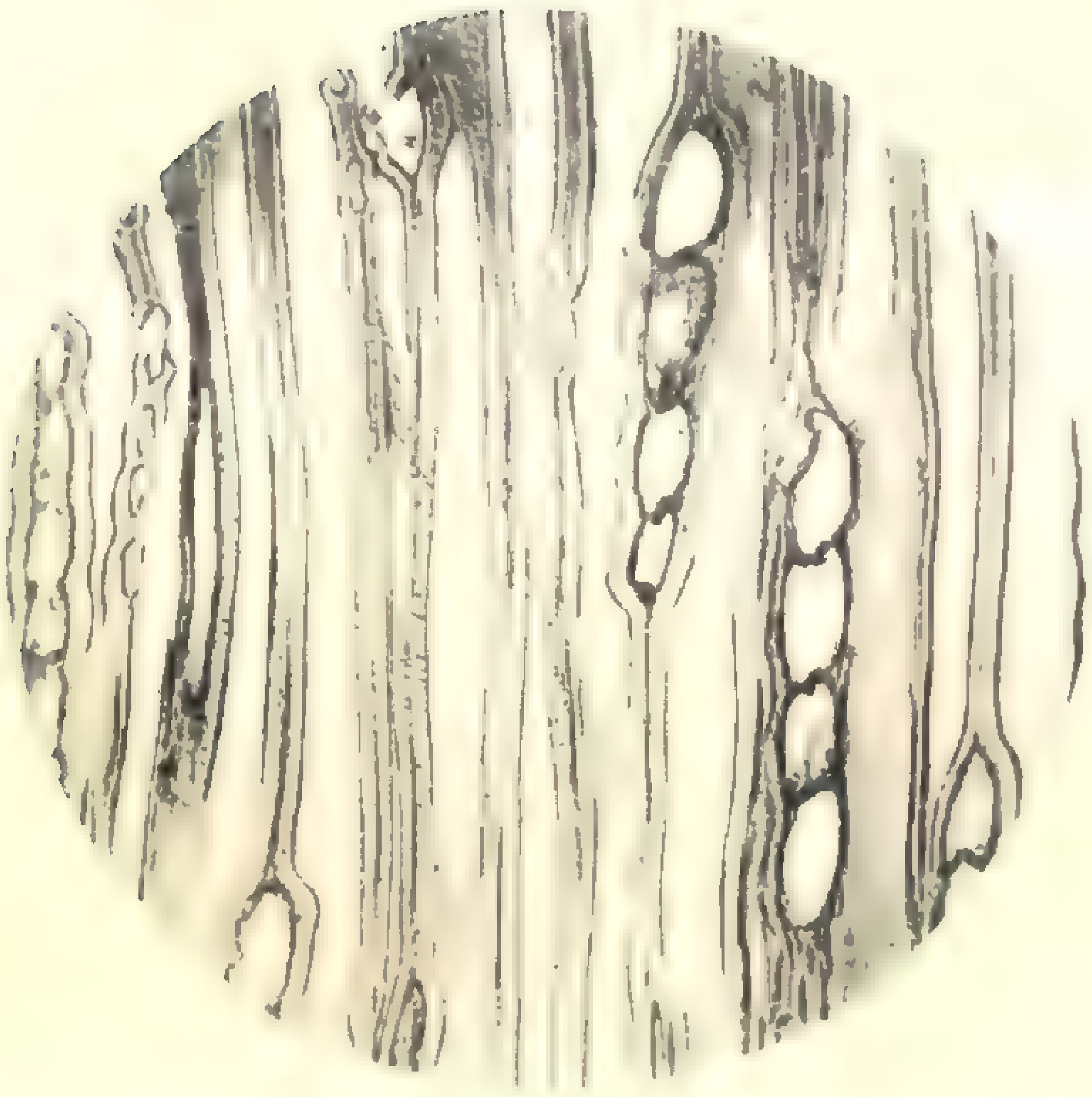
Vol. 11, no. 128, including pages 149 to 164, was issued 9 August, 1909.



1

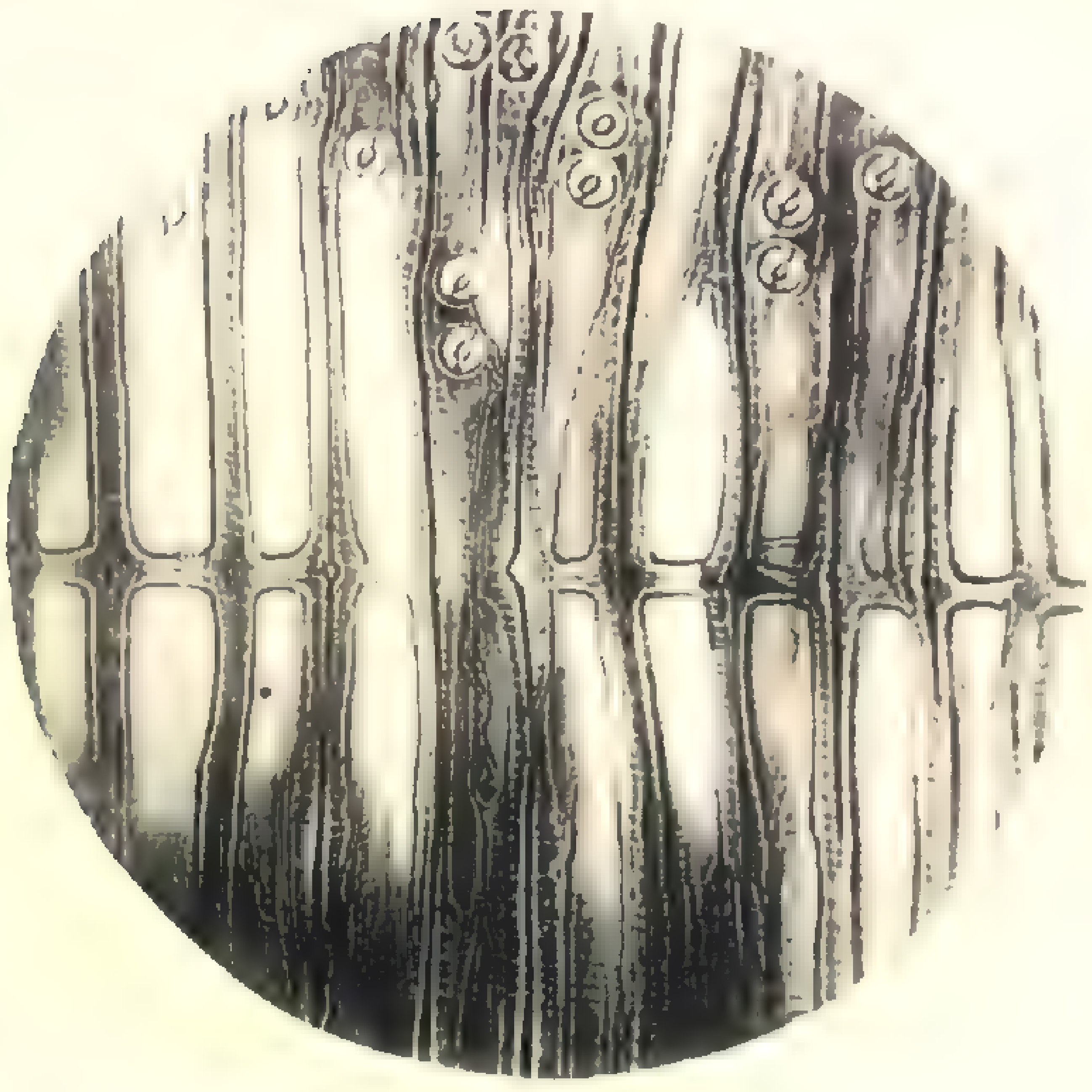


2

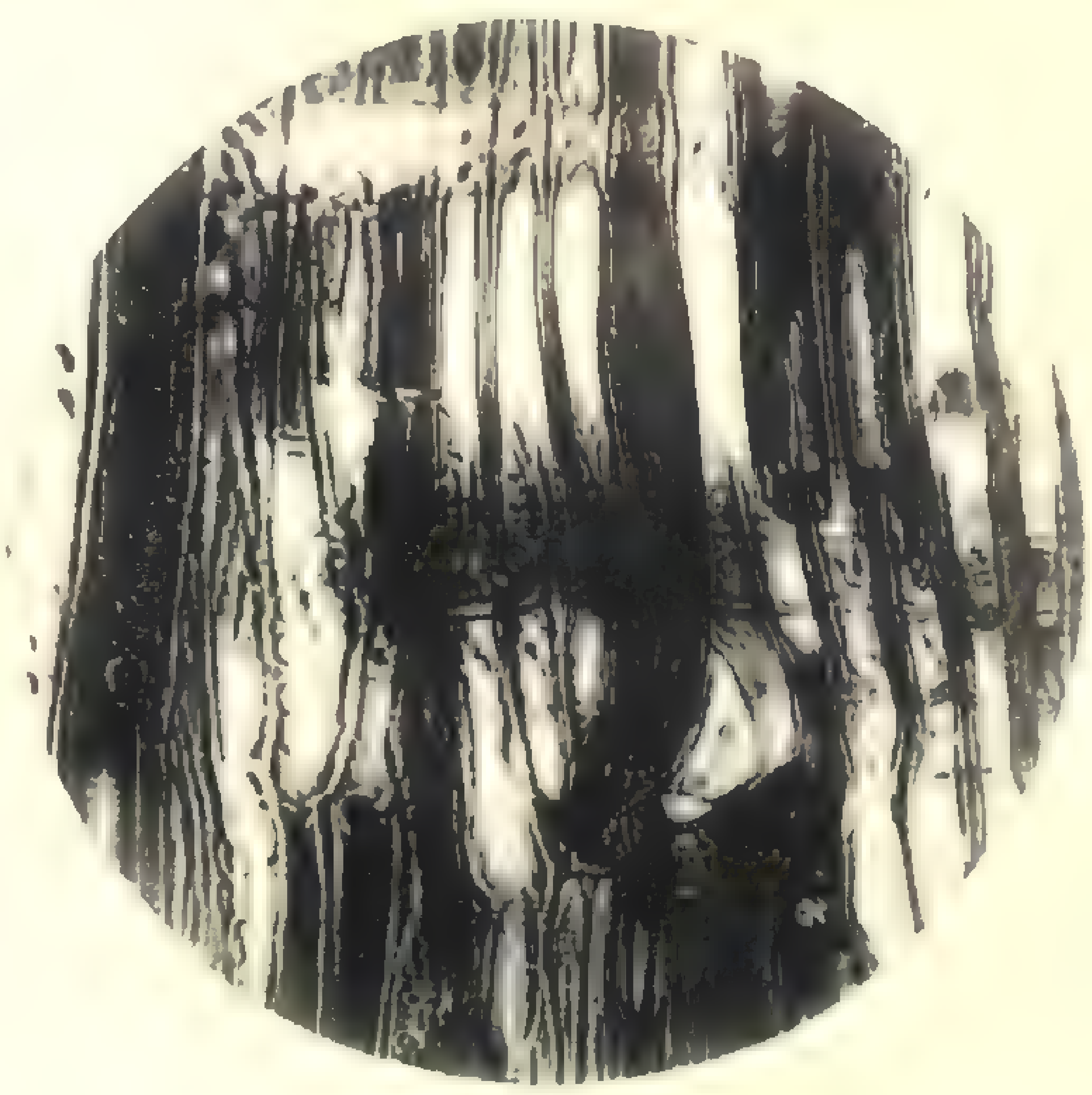


3

4

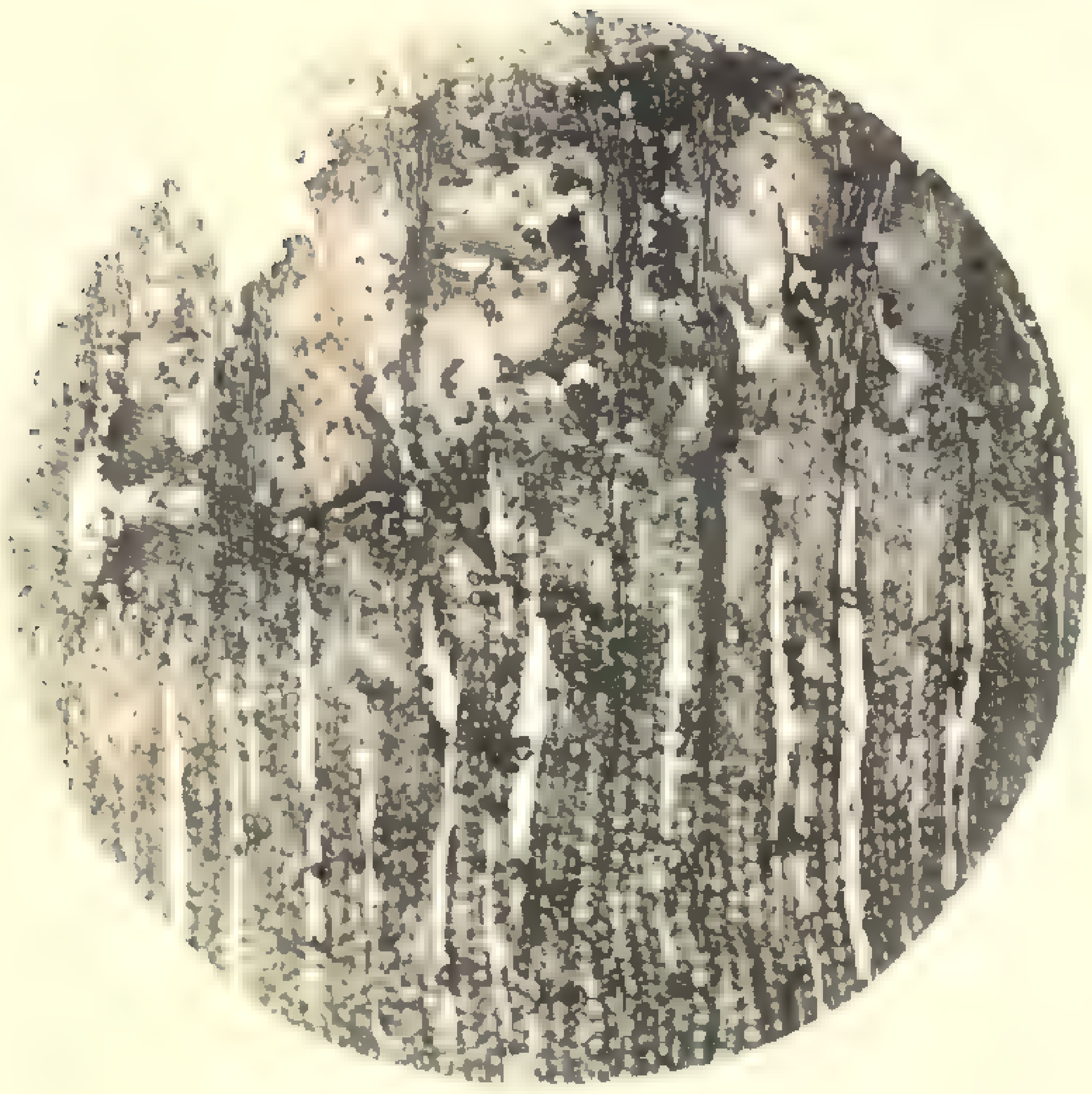


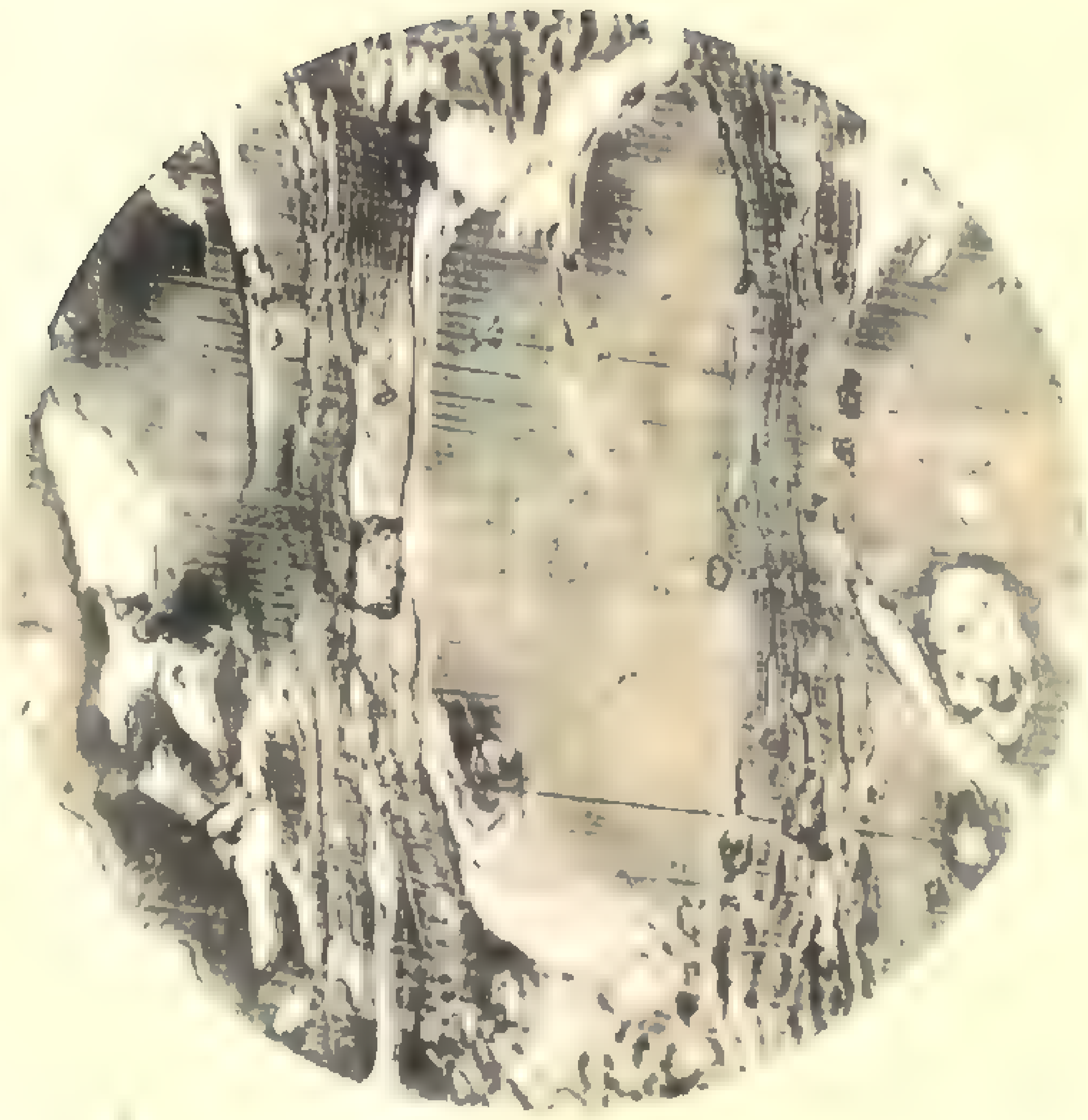
5

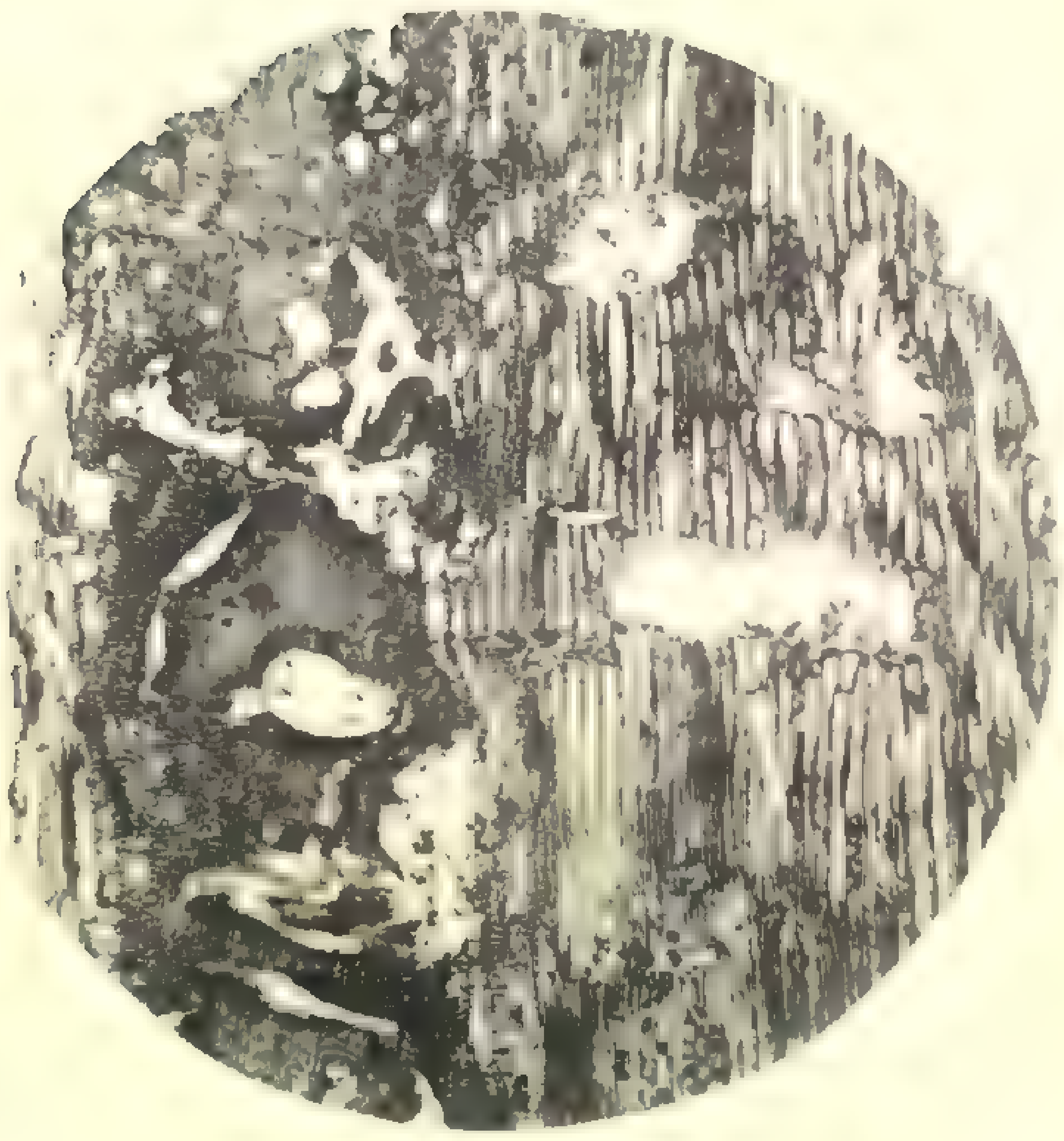


6

PARACEDROXYLON SCITUATENSE.







9

10

11

12

PARACEDROXYLON SCITUATENSE.

Gray's New Manual of Botany — 7th Edition

An illustrated flora of the Northern United States and Canada east of the 96th meridian. By Asa Gray, LL.D., late Professor of Natural History, Harvard University. Thoroughly revised and largely rewritten by Benjamin Lincoln Robinson, Ph.D., Asa Gray Professor of Systematic Botany, and Merritt Lyndon Fernald, S.B., Assistant Professor of Botany, Harvard University, assisted by specialists in certain groups. With more than nine hundred text figures.

Regular Edition. Cloth, illustrated, 8vo, 928 pages. Price, $2.50.

Tourist's Edition. Limp leather, 5×7½ inches. Price, $3.00.

AMERICAN botanists, who have been impatiently awaiting the revision of this indispensable work, will be delighted to know that a seventh, completely revised, and copiously illustrated edition, is now ready. The revision has entailed years of work by skilled specialists. No effort or expense has been spared to attain the highest degree of clearness, terseness, and accuracy. The plant families have been rearranged in a manner to show the latest view of their affinities, and hundreds of species have been added to the flora. The nomenclature has been brought into thorough accord with the important international rules recently established — a feature of great significance. Indeed, the Manual is the only work of its scope which in the matter of nomenclature is free from provincialism and rests upon a cosmopolitan basis of international agreement. Nearly a thousand figures have been added, and scores of brief and lucid keys have been introduced in a manner which greatly simplifies the problem of plant identification. The work has been extended to include Ontario, Quebec, and the maritime provinces of Canada.

AMERICAN BOOK COMPANY

New York Cincinnati Chicago Boston

HOME GROWN LILIES.

Fresh from Beds. Wild Flowers, Hardy plants of all kinds.
Send for catalogue.

F. H. Horsford, Charlotte, Vt.

BIRDS OF MAINE

is the latest and most complete work on northeastern bird life. It is an illustrated work of 693 pages and contains descriptions of the plumage and full accounts of the nests, eggs, habits and general home life of 327 species of birds. As a book for the amateur or for the scientific student of bird life in northeastern America it is unexcelled. Sent prepaid on receipt of price, $3.50. Address all orders to

ORA WILLIS KNIGHT, 84 Forest Avenue, Bangor, Maine.

CAMBRIDGE BOTANICAL SUPPLY COMPANY,

WAVERLEY, MASS.

BOTANICAL SUPPLIES OF EVERY DESCRIPTION.

Samples of Driers and Mounting Papers sent on request.
ASK FOR NEW CATALOG, NO. 91.

STANDARD MATERIAL. IMMEDIATE SHIPMENT.
Physiological Instruments. How do Plants Work?

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB.

Conducted and published for the Club, by
BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS
MERRITT LYNDON FERNALD } Associate Editors.
HOLLIS WEBSTER

WILLIAM PENN RICH
EDWARD LOTHROP RAND } Publication Committee.

Vol. 11. October, 1909. No. 130.

CONTENTS:

American Crataegi in the Species Plantarum. *C. S. Sargent* 181
Status of Arenaria stricta in New Hampshire. *M. L. Fernald* 184
Notes on New England Hepaticae,— VII. *A. W. Evans* . 185
An algological Prophecy fulfilled. *F. S. Collins* . . . 196
The Exoperidium in Calostoma Ravenelii. *H. H. Bartlett* . 197
Plants new to Vermont. *N. F. Flynn* 198
A Form of Kalmia latifolia. *G. E. Stone* 199
Scirpus lineatus in New Hampshire. *F. W. Batchelder* . 200

Boston, Mass.
1052 Exchange Building.

Providence, R. I.
Preston and Rounds Co.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price $1.00 per year ($1.25 to all foreign countries including Canada); single copies 15 cents. Volume 1, $2.00, Vol. 2, $1.50. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

B. L. ROBINSON, 3 Clement Circle, Cambridge, Mass.

Subscriptions, advertisements, and business communications to

W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

Single copies may be had from

E. L. RAND, Corresponding Sec'y N. E. Botanical Club,
1052 Exchange Building, Boston, Mass.

Entered at Boston, Mass., Post office as Second Class Mail Matter

---

SYNOPTICAL FLORA OF NORTH AMERICA, by A. GRAY and others. Vol. I. Fascicles 1 and 2. A critical treatment of forty-five families of polypetalæ (*Ranunculaceæ to Polygalaceæ*) 1895-1897. $5.20.—GRAY HERBARIUM of Harvard University, Cambridge, Mass.

KEY TO NEW ENGLAND TREES, Wild and Commonly Cultivated, based primarily upon leaf characters, by J. FRANKLIN COLLINS and HOWARD W. PRESTON. Price 40c. net. PRESTON & ROUNDS CO., Providence, R. I.

WASHINGTON'S FLORA.

A few complete sets and some incomplete ones of my Fascicle XII of Washington Plants are still on hand; also specimens of many species distributed in earlier fascicles. Send for lists.

W. N. SUKSDORF - - Bingen, Wash., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collectors' memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3-4 in. 1 year $4.00, 6 months $2.50.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 11. October, 1909. No. 130.

AMERICAN CRATAEGI IN THE SPECIES PLANTARUM OF LINNAEUS.

C. S. Sargent.

Since the publication last year in Rhodora (x. May, 1908) of Mr. Eggleston's notes on the species of Crataegus described by Linnaeus I have had the opportunity to examine again the specimens of Crataegus in the Plukenet Herbarium at the British Museum and the specimens of this genus preserved in Linnaeus's own herbarium.

Three of the four species of Crataegus described by Linnaeus in the first edition of the *Species Plantarum* are what may be called book species, that is there is no evidence that Linnaeus had ever seen a specimen of these plants when his descriptions were published in 1753, these having evidently been based on the descriptions and figures of earlier authors. Of the fourth species, *Crataegus viridis*, there is a specimen in the Linnaean Herbarium collected by Clayton in Virginia which Linnaeus may have seen before his description was written. Several years ago I made out that this specimen represented the plant described later by Elliott as *Crataegus arborescens*, although at that time this species had not been rediscovered in Virginia. It is interesting to report, therefore, that *Crataegus viridis* Linnaeus (*C. arborescens* Elliott) was found by Mr. Rehder last summer on the bank of the Blackwater River near Zuni in southeastern Virginia.

Crataegus Crus-galli was described by Linnaeus from Plukenet's figure and description. The specimen which appears to have served in part, at least, as the subject for Plukenet's figure (*Alm. Bot.* 149, t. 46, f. 1) is preserved in his herbarium. It is a young shoot without flowers and fruits, and although I suspect that it is not the plant which is now usually considered to be *Crataegus Crus-galli*, it is impossible

to say what it is except that it is from one of the Crus-galli Group of species. The specimen labeled *Crataegus Crus-galli* in Linnaeus's Herbarium is also only a barren shoot. It was collected by Kalm and no locality is given. It is certainly one of the Crus-galli Group, and probably represents a different species from the specimen in the Plukenet Herbarium. In spite of the doubt which these specimens raise on the identity of *Crataegus Crus-galli* of Linnaeus, it does not seem desirable or necessary to abandon his name as no confusion is likely to occur by retaining it.

It is not possible to guess even at the plant described by Linnaeus as *Crataegus tomentosa*. His species was based on the specimen collected by Clayton in Virginia and, unfortunately, this is one of the few of Clayton's specimens which is not preserved in the British Museum. On the sheet labeled *Crataegus tomentosa* in Linnaeus's Herbarium there are two specimens collected by Kalm without locality. One is evidently what is now generally called *Crataegus tomentosa* and the other is one of the thick-leaved Tomentosae species. It is of interest, perhaps, that there is a thorn on the first of these specimens as *Crataegus tomentosa* is usually thornless, although "*ramis spinosis*" appears in Linnaeus's description of his *Crataegus tomentosa*. As no confusion is likely to arise from retaining the name of *Crataegus tomentosa* for the plant now generally considered to be that species, there appears to be no good reason for abandoning the name.

Crataegus coccinea was established by Linnaeus on Plukenet's figure (*Alm. Bot.* t. 46, f. 4.). The figure well represents one of the three specimens so numbered preserved in Plukenet's Herbarium. The numbers published by Plukenet have been written below the specimens of his herbarium by some one now unknown and perhaps after the collection had become the property of the British Museum. Under the specimen which is the type of Linnaeus's *Crataegus coccinea* there is a note by Robert Brown confirming the determination. Mr. Eggleston's statement that the type of *Crataegus coccinea* was an unnumbered specimen found by Mr. Britten is not clear. All the specimens in Plukenet's Herbarium are numbered and Mr. Britten assures me that he has no recollection of having made such a statement. It is probable, however, that the fruit that he sent to Mr. Eggleston is from the specimen represented on plate 46, f. 4, as one of the seven fruits figured by Plukenet is missing. The leaves of this specimen are only slightly villose on the upper surface; the fruit is

glabrous and the pedicels are slightly hairy; and it cannot, as Mr. Eggleston has suggested, represent *Crataegus modesta.* The specimen is thornless and the detached thorn in the Plukenet figure may have been taken from one of the two other specimens in the Plukenet Herbarium which the same unknown person has referred to the plant figured on t. 46, f. 4. The thorns on one of these specimens are slightly thicker and on the other they are more recurved than that figured by Plukenet. These three specimens in the Plukenet Herbarium referred to t. 46, f. 3, certainly all represent different species either in the Molles or Lobulatae Groups, and I am unable to identify any of them. The matter is further confused by the fact that Linnaeus also referred to his *Crataegus coccinea* the plant figured in the *Hort. Angl.* t. 13, f. 1, which is *Crataegus cordata.* The specimen labeled *Crataegus coccinea* in the Linnaean Herbarium was from a plant cultivated in the Upsala Garden, and, being unable to determine any of Plukenet's specimens, it was this specimen that I formerly considered the type of *Crataegus coccinea* and referred to it a common species of the New England coast and the St. Lawrence Valley (see *Bot. Gazette,* xxxi. 11). Aiton's specimen of *Crataegus coccinea* in the British Museum is a barren shoot of some Molles species.

Under Rule 51 of the Vienna code it is provided in Section 4 that every one should refuse to adopt a name "when the group which it designates embraces elements altogether incoherent or when it becomes a permanent source of confusion and error." This is the case of *Crataegus coccinea.* Certainly the type of *Crataegus coccinea* cannot be determined and a large number of different species have at different times been called *Crataegus coccinea.* It appears therefore desirable to abandon the name entirely and to find a new name for the plant figured as *Crataegus coccinea* in The *Silva of North America* and in the *Manual of North American Trees.* A glabrous form of this which I have called *Crataegus coccinea rotundifolia* was first described in 1785 by Moench (*Bäume Weiss.* 29, t. 1) as *Crataegus rotundifolia,* which would therefore be the name of the species if the hairy and the glabrous forms are considered to belong to one species; and the hairy plant which I have described as *Crataegus coccinea* may then become **Crataegus rotundifolia** var. **pubera.**

Arnold Arboretum.

THE STATUS OF ARENARIA STRICTA IN NEW HAMPSHIRE.

M. L. Fernald.

Among the specimens which came to the New England Botanical Club in the transfer of the herbarium of the Middlesex Institute to the Club was a sheet of *Arenaria* with the label "*Arenaria Groenlandica* Spreng. Mt. Washington, Aug. 7, 1881. W. H. Manning." The sheet which, besides the complete label, bears the small penciled field-label of Mr. Manning, has upon it a single flowering branch which is unquestionably *A. stricta* Michx. Although *A. stricta* is very rarely met east of the calcareous regions of western New England and diligent search by many active botanists has failed to show other evidence of it upon Mt. Washington, the known occurrence in the White Mountain area of a few limited calcareous outcrops and the recent discovery there of local plants formerly unknown in the region made it advisable to give Mr. Manning's specimen due record in the seventh edition of Gray's Manual.

Recently, however, in looking over a package of specimens from outside New England which came from the collections of the Middlesex Institute, I have found a sheet which throws new light upon the matter. This sheet has Mr. W. H. Manning's field-label: "*Arenaria stricta.* Glens Falls, N. Y. June 22, 1881. W. H. M."; but the specimen beside which the label is glued is very characteristic *A. groenlandica*! It is quite evident, therefore, that the record of *A. stricta* from Mt. Washington arose through a transposition of labels; for *A. groenlandica* is one of the commonest plants of Mt. Washington, but in New York is known almost exclusively from the highest summits of the Adirondack, Catskill, and Shawangunk Mountains; and *A. stricta,* otherwise unrecorded from the White Mountains, is in New York common "particularly on the banks of rivers and lakes; northern and western counties." [1]

Although *Arenaria stricta* is thus withdrawn from the list of Mt. Washington plants, there is a station for it at the southwestern edge of the White Mountain area which should be recorded. This colony on

[1] Torr. Fl. N. Y. i. 95 (1843).

"the summit of a hill, Holderness, N. H." was discovered in July, 1891, by Dr. R. C. Manning, Jr., who brought plants to the late Sereno Watson. These specimens are now preserved in the Gray Herbarium and, so far as the writer is informed, represent the only known station for the species in New Hampshire.

Gray Herbarium.

NOTES ON NEW ENGLAND HEPATICAE,—VII.

Alexander W. Evans.

The eight species discussed in the present paper include five distinct additions to the New England flora. The three remaining species have already been noted from New England, but their records have been either uncertain or incomplete. The North American species of *Cephaloziella*, two of which are mentioned below, are in need of further study, and it is probable that other members of this genus will eventually be detected in New England. It is difficult, however, to treat them fully at the present time because most of them occur also in Europe, and European writers still disagree about their limits and relationships.

1. Metzgeria furcata (L.) Dumort. Recueil d'Obs. sur les Jung. 26. 1835. *Jungermannia furcata* L. Sp. Plant. 1136. 1753. *Metzgeria glabra* Raddi, Mem. Soc. Ital. delle Sci. in Modena **18**: 45. *pl. 7, f. 1.* 1818. On rocks and trees. Maine: Buckfield (*J. A. Allen*); Cumberland (*E. B. Chamberlain*). New Hampshire: Cornish (*Miss Haynes*); Jackson (*A. W. E.*). *Metzgeria furcata* was considered a common North American species until the publication of Lindberg's Monographia Metzgeriae in 1877.[1] The earlier writers accepted it in a broad sense and referred to it all the northern forms of the genus which were distinguished from *M. pubescens* by being destitute of cilia on the antical surface of the thallus. According to Lindberg the old *M. furcata*, as thus understood, was an aggregate and

[1] Acta Soc. Faun. Fl. Fenn. **1**: 1–48. 2 pl. 1877.

he separated off, as distinct species, *M. conjugata*,[1] *M. hamata*, and *M. myriopoda*, largely on the basis of characters drawn from the structure of the thallus, the distribution and peculiarities of the marginal and postical cilia, and the nature of the inflorescence. He restricted the name *M. furcata* to what he described as the commonest of all European hepaticae but stated that he had never seen typical specimens of this species from North America. To *M. conjugata*, on the other hand, the only one of his new species which need now be considered, he ascribed a wide distribution on both sides of the Atlantic. Since this time the majority of writers, including such recent authorities as Stephani [2] and C. Müller,[3] have accepted Lindberg's statements with regard to the absence of *M. furcata* from North America and have consequently considered *M. conjugata* as our common representative of the genus. In 1892, however, Miss Boatman [4] recorded *M. furcata* from various localities in North America, extending from North Conway, New Hampshire (*James*), into Mexico, and Underwood [5] soon afterwards published similar observations independently. On the basis of these records the species ought properly to have been included in the writer's Preliminary List of New England Hepaticae,[6] but it was omitted because Underwood himself expressed some doubt as to the correctness of the determinations, most of which were based on thallus characters only. Apparently the specimens quoted above represent the species clearly, so that *M. furcata* may now be definitely reinstated as a member of our flora. Equally clear specimens have been examined also from Indian Brook, Cape Breton (*G. E. Nichols*), and from Onteora Mountain, New York (*Miss Vail*).

All writers agree that *M. furcata* and *M. conjugata* are very closely related. In both species the costa presents the same type of structure, being bounded above by two rows of cortical cells and below by from three to five rows. Lindberg finds the most important difference between the two plants in the inflorescence, *M. furcata* being dioicous and *M. conjugata* autoicous, but he also calls attention to differences in the structure of the thallus, to which he attaches considerable importance. In *M. furcata*, the less robust of the two, the thallus is said to be

[1] This species was first published in Acta Soc. Sci. Fenn. **10**: 495. 1875.

[2] Bull. de l'Herb. Boissier **7**: 941. 1899.

[3] Rabenhorst's Kryptogamen-Flora **6**: 349. 1908.

[4] Bull. De Pauw Sci. Assoc. **1**: 3. 1892.

[5] Bull. Torrey Club **19**: 301. 1892.

[6] Rhodora **5**: 170–173. 1903.

plane, the marginal cilia to occur singly, and the postical surface of the wings to be usually pilose. The marginal cilia are further distinguished by being slightly displaced to the postical surface and therefore not clearly visible from above. In *M. conjugata*, on the other hand, the thallus is said to be convex, the marginal cilia to occur frequently in pairs, and the postical surface of the wings to be practically free from cilia. Unfortunately, as Limpricht and others emphasize, most of these vegetative characters are subject to a good deal of variation, and it is not infrequent to find specimens in which the cilia are either sparingly developed or absent altogether. Even when present they do not always show the peculiarities of arrangement detailed above. Marginal cilia in pairs, for example, may occur in combination with scattered postical cilia, and wings of the thallus which are smooth on both surfaces may show marginal cilia borne singly. The position of these unpaired cilia, moreover, may also vary, being sometimes truly marginal and sometimes displaced to the postical surface. On account of the inconstancy of these vegetative characters Limpricht [1] was inclined to look upon *M. conjugata* as nothing more than a robust and normally developed form of *M. furcata*, due to a favorable environment, and Boulay,[2] still more recently, was unwilling to accord it more than subspecific rank. Most writers, however, accept both species without question, and this seems the wisest course to pursue since specimens with sexual branches usually show the specific characters clearly. The impossibility of determining all sterile material is by no means unusual in other genera of the hepaticae.

Although certain of the characters already mentioned are seen to be untrustworthy, *M. furcata* often produces peculiar organs of vegetative reproduction, which enable us to determine sterile specimens without difficulty. These organs have long been known but it is only lately that they have been at all emphasized from a taxonomic standpoint. They are in the form of marginal gemmae, or propagula, and are ovate to ligulate in outline according to the stage of their development. They are at first only one cell thick throughout but usually acquire a median costa sooner or later. The gemmae are frequently developed in great abundance, and Goebel [3] considers their production to be a direct result of unfavorable conditions. Lindberg described these

[1] Cohn, Krypt.-Flora von Schlesien **1**: 441. 1876.
[2] Musc. de la France **2**: 170. 1904.
[3] Flora **83**: 69–74. 1898.

marginal gemmae clearly for *M. furcata* but made no allusion to them in his description of *M. conjugata*, thus implying that they did not occur in this species. Goebel[1] goes still farther; he associates marginal "adventive branches" definitely with *M. furcata*, and says that *M. conjugata* is characterized by the occasional production of gemmae of an entirely different type. Miss Boatman, to be sure, describes marginal gemmae for *M. conjugata*, but her statements have not been confirmed by subsequent writers and it seems probable that her descriptions were not drawn from the true *M. conjugata*. On the whole the evidence at present appears to indicate that the marginal gemmae of *M. furcata* yield important differential characters, and it seems safe to assume that such gemmae do not occur in *M. conjugata*. The writer hopes to discuss the vegetative reproduction of *Metzgeria* more fully in another connection.

2. **Metzgeria crassipilis** (Lindb.) sp. nov. *Metzgeria furcata*, subsp. *Metzgeria crassipilis* Lindb. Acta Soc. Faun. Fl. Fenn. **1**: 42, 1877. On rocks. Vermont: Lake Dunmore (*W. G. Farlow*). Connecticut: New Haven (*D. C. Eaton*); Orange (*J. T. Phinney*). Although Lindberg, as already noted, saw no specimens of typical *M. furcata* from North America, he described a peculiar plant from the eastern United States under the above name, including it under *M. furcata* as a subspecies. He was able to study two specimens of this plant, one from Laurel Hill, Pennsylvania (*Sullivant*), and the other from Ben Lomond, Warren County, Tennessee (*Fredriksson*). Neither of these specimens has been accessible to the writer, but Lindberg's description is so detailed and so clear that there can be but little doubt as to the correctness of the above determinations. For some strange reason *M. crassipilis* has been completely overlooked or ignored since its original publication but it is amply distinct from *M. furcata*, and Lindberg would undoubtedly have described it as a distinct species if he had had a more liberal supply of material at his disposal. It has a fairly wide distribution and the following localities, outside of New England, may also be recorded. New York: Chilson Lake (*Mrs. Smith*); Little Moose Lake (*Miss Haynes*); Shandakan (*Miss Miller*). West Virginia: Seebert and Warntown (*J. L. Sheldon*). Virginia: Nick's Creek and Walker's Mountain (*J. K. Small*); Dickey's Creek and Hungry Mother Creek (*Mrs. Britton and Miss*

[1] Organographie der Pflanzen 275. 1898.

Vail). North Carolina: Blowing Rock Mountain (*J. K. Small*); Hog Back Mountain (*H. A. Green*).[1]

In its dioicous inflorescence *M. crassipilis* agrees with *M. furcata*, and the costa is built up on the same type in the two species. The thallus of *M. crassipilis*, however, is more or less convex, the postical surface of the wings is usually densely pilose, and the marginal cilia (although occurring singly) are not displaced to the postical surface. The cells of the thallus, also, average less than 35 μ in diameter, whereas in *M. furcata* they average more than 35 μ. But the most remarkable structures found in *M. crassipilis* are the gemmae. These are frequently produced in great abundance and arise on the antical surface of the wings and not on the postical surface as Lindberg described. Each gemma is in the form of a circular disc, one cell thick throughout and usually showing a single two-sided apical cell. The surface of the gemma is smooth but the margin usually bears a few straight cilia, irregularly distributed. The gemmiparous branch is not strongly modified in appearance, but the development of the gemmae tends to limit its growth. Lindberg describes the female branch as being smooth, but it shows this condition only when immature; as it grows older it becomes sparingly setose or pilose along the margin and occasionally develops a very few short surface cilia. The antheridial branch is smooth, and the calyptra and sporophyte are still unknown.

According to Lindberg *M. crassipilis* is to a certain extent intermediate between *M. furcata* and *M. dichotoma* (Swartz) Nees, a tropical species known from the West Indies and Brazil. In *M. dichotoma*, which is rather more robust than *M. crassipilis*, the costa is bounded above by from three to five cells and below by from five to eight, the cells average about 50 μ in diameter, the cilia are longer and more abundant, and the female branch is pilose. The gemmae of *M. dichotoma*, so far as Lindberg describes them, are similar to those of *M. crassipilis* and also arise from the surface of the thallus-wings.

3. Pellia Fabroniana Raddi, Mem. Soc. Ital. delle Sci. in Modena **18**: 49. *pl. 7. f. 5.* 1818. *Jungermannia calycina* Tayl.; Mackay, Fl. Hibern. **2**: 55. 1836. *Pellia calycina* Nees, Naturgeschichte der europ. Leberm. **3**: 386. 1838. Wet bank of brook; Newfane, Vermont (*A. J. Grout*). The species is sometimes known as *P.*

[1] The specimens from several of these localities have been listed elsewhere as *M. conjugata*. See Mem. Torrey Club **4**: 195. 1893. Also Adirondack League Club Year Book for 1904: 45.

endiviaefolia (Dicks.) Dumort. The original *Jungermannia endiviaefolia* of Dickson (Pl. Crypt. Brit. **4**: 19. 1801) was apparently based on an old figure of Vaillant, and there is so much uncertainty about it that most of the recent European writers have given it up in favor of the later name of Raddi, about which there seems to be no doubt. In the Bryologist for May, 1905, Grout refers his specimens with some hesitation to *P. Neesiana* (Gottsche) Limpr. Since they are entirely destitute of mature capsules their determination is beset with difficulties and we are obliged to rely on characters derived from the thallus. Fortunately the internal cells of the median region afford structural differences which are available even in sterile material. In *P. Neesiana,* as well as in *P. epiphylla* (L.) Corda, many of these cells show vertical bands of thickening in their walls, and these bands are often pigmented with purple or red. They can be most easily demonstrated by cutting longitudinal sections through the thallus, although they are sometimes seen almost as clearly in transverse section. In *P. Fabroniana* bands of this character are not developed, the cells of the thallus being everywhere thin-walled. Since Grout's specimens are also destitute of these bands they are here referred to *P. Fabroniana* instead of to *P. Neesiana.* Comparatively few of the publications relating to *Pellia* make use of these bands in distinguishing the species, although attention was called to them many years ago by Leitgeb.[1] C. Müller,[2] however, emphasizes their importance and gives an excellent figure of them as they appear in *P. epiphylla.*

4. Pellia Neesiana (Gottsche) Limpr.; Cohn, Krypt.-Flora von Schlesien **1**: 329. 1876. *Pellia epiphylla,* forma *Neesiana* Gottsche, Hedwigia **6**: 69. 1867. On wet rocks; Wintergreen Falls, Hamden, Connecticut (*A. W. E.*). The species is probably widely distributed in New England but is easily confused with *P. epiphylla.* All three species of the genus are common in Europe and Asia. The striking difference in the structure of the thallus, which separates *P. Neesiana* from *P. Fabroniana,* is supplemented by still more striking differences in the structure of the capsule. In *P. Neesiana* the cells forming the inner layer of the capsule-wall develop local wall-thickenings in the form of incomplete rings; the elater-bearers at the base of the capsule are 15–25 μ in diameter and number from 20 to 30; while the elaters

[1] Unters. über Lebermoose **3**: 53 (footnote). 1877.
[2] Rabenhorst's Kryptogamen-Flora **6**: 9. *f. 2.* 1906.

themselves are about 8 μ in diameter and show two spirals. In *P. Fabroniana*, on the other hand, the inner layer of the capsule-wall is without local thickenings; the elater-bearers are only 5–8 μ in diameter and number about 100; while the elaters themselves are 10–12 μ in diameter and show three or four spirals. The differences in the structure of the capsule are fully discussed by Jack.[1]

The relationships between *P. Neesiana* and *P. epiphylla* are very close indeed, both thallus and capsule showing the same structure in the two species. There are, however, two important differences between them. In *P. Neesiana* the inflorescence is dioicous, and the involucre is in the form of a short but complete sheath with an irregular margin. In *P. epiphylla* the inflorescence is monoicous (paroicous), and the involucre is represented by a short flap of the thallus on the basal side of the sporophyte. *P. Fabroniana* agrees with *P. Neesiana* in being dioicous and in developing a tubular involucre, but the latter is long and extends beyond the calyptra, whereas in *P. Neesiana* the calyptra extends beyond the involucre at maturity. The differences just noted are very clearly shown by C. Müller [1] in a series of schematic figures.[2] It will be seen from the foregoing statements that sterile specimens of *Pellia* with bands of thickening in the internal cells of the thallus are quite indeterminable.

5. Cephaloziella elachista (Jack) Schiffn. Lotos **48**: 338. 1900. *Jungermannia elachista* Jack; Gottsche & Rabenhorst, Hep. Europ. *574* (with figures). 1873. *Cephalozia elachista* Lindb. Acta Soc. Sci. Fenn. **10**: 502. 1875. On a decayed stump in a bog; Reading, Massachusetts (*C. C. Kingman*). Not before recorded for America. Widely distributed in Europe but apparently rare. This delicate little species seems to be confined to bogs and is characterized primarily by an autoicous inflorescence and by distant, sparingly dentate leaves. The plant is pale green in color and the prostrate stems are sparingly branched. The deeply bifid leaves are almost transversely inserted and tend to spread widely from the axis. Their lobes are slender and sharp-pointed, usually from four to six cells long and from two to four cells wide at the base, and they are frequently inflexed at the apex. The leaf-cells have a smooth cuticle and are thin-walled; in the middle of the lobes they measure 19–24 μ in length

[1] Flora **81** (Ergänz.-Band): 1–16. *pl. 1.* 1895.
[2] Rabenhorst's Kryptogamen-Flora **6**: 369. *f. 218.* 1908

by about 12 μ in width. The marginal teeth are sometimes absent altogether, and it is rare to find more than one tooth on a lobe, consisting usually of a single projecting cell. The underleaves are minute and are not always present. The lobes of the perigonial bracts are toothed, but the teeth are more numerous and better developed on the perichaetial bracts; they differ in length and extend irregularly in various directions. The perianth is long and in the form of a triangular prism, minutely crenulate at the mouth from projecting cells. Gemmae are frequently present and are usually borne at the tips of more or less elongated branches where they form spherical masses. They are elliptical in form with thin walls and rounded ends; they measure about 17×9 μ and are usually bicellular. As a rule it is quite impossible to distinguish leaves in the gemmiparous region, although this is not always the case.

The original specimens of *Jungermannia elachista*, collected by Jack at Salem in Baden and distributed by Gottsche and Rabenhorst, are badly mixed with a second species of *Cephaloziella*, which Schiffner refers to *C. byssacea* (Roth) Schiffn. (= the *C. divaricata* of many authors). In the set of the Hepaticae Europaeae in the Eaton herbarium, No. 574 is made up almost entirely of this second species, but the few sterile stems which seem referable to *J. elachista* agree with the Massachusetts specimens. The range of variation and the relationships of the species are not yet clearly understood.

6. Cephaloziella Hampeana (Nees) Schiffn. Oesterr. Bot. Zeitschr. **54**: 256. 1904. *Jungermannia Hampeana* Nees, Naturgeschichte der europ. Leberm. **3**: 560. 1838. *Cephaloziella trivialis* Schiffn. Lotos **48**: 341. 1900. *C. erosa* Limpr.; Warnstorf, Kryptogamenfl. der Mark Brandenburg **1**: 233. *f. 6.* 1902. *Cephalozia erosa* Massal. Malpighia **21**: 36. 1907. On a rotten log in a swamp; near Schoodic Lake, Piscataquis County, Maine (*A. W. E.*). On moist rocks; Naugatuck, Connecticut (*A. W. E.*), sterile; specimens with male and female flowers afterwards collected in the same locality by Miss Lorenz. Not before recorded from North America but widely distributed in Europe. The above synonymy is mostly quoted from Schiffner, who suggests that it be accepted somewhat tentatively, the relationships between the present species and the closely allied *C. bifida* (Schreb.) Schiffn. being not yet definitely established. The specimens which are here referred to *C. Hampeana* agree closely with the type material of *C. trivialis*, collected by Dreesen

near Bonn and distributed in Gottsche and Rabenhorst's Hepaticae Europaeae, No. 598, under the name *Jungermannia divaricata*. They are deep green in color with occasionally a tinge of brownish. The stems are sparingly and irregularly branched, while the leaves are distant and widely spreading with broad triangular lobes acute at the apex. The lobes are usually from eight to twelve cells long and from six to ten cells wide at the base; their margins are either entire or vaguely and irregularly crenulate. The leaf-cells average about 15× 11 μ and have thin walls. Underleaves may or may not be present. The inflorescence is autoicous. The female branch varies more or less in length but is usually elongated, and the leaves gradually increase in size toward the archegonia. The lobes of the bracts are sometimes entire or nearly so and sometimes minutely and irregularly denticulate. The lobes of the perigonial bracts also show minute teeth or crenulations occasionally but are more frequently entire. Gemmae are sometimes very abundant and closely resemble those described for *C. elachista*.

As thus described *C. Hampeana* is a variable species agreeing with *C. elachista* in its autoicous inflorescence. It is, however, more robust, the lobes of its leaves are broader and less sharp-pointed, the leaf-cells are smaller, and the margins of both leaves and bracts are less toothed. When Schiffner first published his *C. trivialis* he suggested that the *Cephalozia divaricata* described by Heeg[1] might also be regarded as a synonym. Warnstorf[2] considers this open to doubt from the fact that Heeg's plant seems to be distinctly dioicous, and Schiffner has made no further allusions to the matter in his more recent papers. Heeg's species differs from the true *C. divaricata*, as understood by Schiffner and others, and has not yet been definitely reported from North America. The various ways in which *C. divaricata* is interpreted by European botanists is discussed by Miss Lorenz[3] in a recent publication.

7. Calypogeia Neesiana (Massal. & Carest.) C. Müll. Frib.; Loeske, Verhandl. Bot. Ver Prov. Brandenburg **47**: 320. 1905. *Kantia Trichomanis, β Neesiana* Massal. & Carest. Nuovo Giorn. Bot. Ital. **12**: 351. *pl. 11, f. 3.* 1880. *Calypogeia Trichomanis*, var. *Neesiana* C. Müll. Frib. Beih. zum Bot. Centralbl. **10**: 217. 1901. *Cincinnulus Trichomanis*, var. *Neesiana* C. Müll. Frib. *ibid.* **13**: 97.

[1] Verhandl. der k. k. zool.-bot. Gesellsch. in Wien **43**: 95. 1893.
[2] Kryptogamenfl. der Mark Brandenburg **1**: 227. 1902
[3] Bryologist **12**: 25–27. 1909.

1902. *Kantia Neesiana* Migula, Kryptogamen–Fl. von Deutschland, etc. **1**: 462. 1904. *Calypogeia integristipula* Steph. Bull. de l'Herb. Boissier II. **8**: 662. 1908. On rotting logs in a cedar bog; Monkton, Vermont (*L. W. Riddle*). Not before recorded from North America but probably with an extensive range. Widely distributed in Europe and northern Asia. Although *C. Neesiana* has been considered a mere form or variety of *C. Trichomanis* until very lately, European writers are now showing a marked tendency to accept it as a valid species. It is a robust plant, equalling *C. Trichomanis* in size, and is characterized by oval leaves, rounded or truncate at the apex, and by large orbicular or reniform underleaves, usually quite undivided but sometimes emarginate or bluntly bifid to about one fourth, these various conditions being often found on a single stem. The underleaves are further distinguished by their more or less elongated cells with thin walls. Unfortunately, as in other members of this difficult genus, many of the slender and sterile stems fail to show the characters of the species clearly, but well developed plants are not difficult to determine. In a recent paper Meylan[1] discusses *C. Neesiana* fully and concludes that its characters are much more constant than those of *C. fissa* Raddi, which most botanists now recognize as a species; he emphasizes, however, its very close relationship to *C. Trichomanis*.

8. Scapania glaucocephala (Tayl.) Aust. Bull. Torrey Club **6**: 85. 1876. *Jungermannia glaucocephala* Tayl. Lond. Jour. Bot. **5**: 277. 1846. *Scapania Peckii* Aust. Proc. Acad. Philadelphia for 1869: 218. On a rotten log; Waterville, New Hampshire (*Miss Lorenz*). Although the present plant has been quoted from New England this is the only definite station which the writer is able to cite. The species is peculiar to North America and its known range extends westward to Minnesota and northward into Canada. Its most important peculiarities have already been noted in connection with the closely related *S. apiculata* Spruce,[2] but it may be well to allude to them briefly again. It is characterized especially by its upright flagelliform shoots bearing gemmae in abundance. These are oval and usually unicellular and are deeply pigmented with brown or purple. The leaves upon which the gemmae are borne have thick-walled cells without distinct trigones. The normal leaf-cells are much smaller

[1] Rev. Bryol. **36**: 53–58. 1909.
[2] Rhodora **9**: 71. 1907.

and are thin-walled throughout or with very minute trigones. The gemmiparous shoots bear a marked resemblance to those found in *Sphenolobus Hellerianus* but are considerable larger. According to C. Müller [1] the perianth is still unknown. Austin, however, describes it for his *S. Peckii*, and it is figured by Pearson.[2] The species is evidently in need of further study.

The following represent additions to local state floras not included in the preceding notes:— *Calypogeia tenuis*, Reading, Massachusetts (*C. C. Kingman*); *Cephalozia pleniceps*, Willoughby, Vermont (*Miss Lorenz*); *Cephaloziella myriantha*, Biddeford Pool, Maine (*Miss Lorenz*); *Cololejeunea Biddlecomiae*, Buckfield, Maine (*J. A. Allen*); *Lepidozia sylvatica*, Cape Elizabeth, Maine (*A. W. E.*); *Lophozia confertifolia*, Mount Mansfield, Vermont (*Miss Lorenz*); *L. longiflora*, Mount Lafayette and Carragain Pond, New Hampshire (*Miss Lorenz*); *Scapania gracilis*, Madison, New Hampshire (*H. H. Bartlett*); *Sphenolobus Hellerianus*, Willoughby, Vermont (*Miss Lorenz*); *S. Michauxii*, Mount Greylock, Massachusetts (*A. LeRoy Andrews*). From specimens sent by C. C. Kingman the Massachusetts records for *Chiloscyphus pallescens* and *Anthoceros punctatus* may now be marked with the sign " + ".

The census of New England Hepaticae now stands as follows: Total number of species recorded, 155; number recorded from Maine, 106; from New Hampshire, 120; from Vermont, 90; from Massachusetts, 85; from Rhode Island, 64; from Connecticut, 110; common to all six states, 43.

Yale University.

[1] Nova Acta Acad. Caes. Leop. Carol. **83**: 264. 1905.
[2] List of Canadian Hepat. *pl. 8.* 1890.

AN ALGOLOGICAL PROPHECY FULFILLED.

F. S. Collins.

I have lately taken considerable interest in those forms of algae that show special adaptations to particular conditions, epi- or endophytic, epi- or endozoic habitat, and the like, of which many are known, both fresh water and marine, and doubtless many more will be discovered. One for which I have been looking is *Dermatophyton radians* Peter, a green alga that forms a firm crust on the backs of turtles, penetrating into the crevices; it was first found in Europe, and has once been found in this country. For the last two or three years I have waylaid turtles at many ponds, but have found no trace of the alga; the shells have been bare and smooth. But one day in June last, in Tewksbury, Massachusetts, I saw a turtle near the edge of a pond, with a distinct green growth on the shell. I proceeded towards him with the utmost caution, as turtles are not easily taken unaware, but soon a sense, other than sight, notified me that he was not likely to escape; he was no ways superior in appearance to other mud turtles, and yet it would hardly be incorrect to speak of him as unapproachable. I succeeded in scraping off some of the growth, which as I had supposed was a green alga, but it certainly was not the *Dermatophyton*; the substance was much softer. Only when I reached home and examined it with the microscope did I recognize it; it was *Chaetomorpha Chelonum*, the plant that I described in Rhodora, Vol. IX, p. 199, from material sent me from Michigan, where Dr. Hankinson found it on two species of turtle. Now in connection with my description I referred to what Lagerheim said, when describing *C. herbipolensis*, the first, and until my note the only certain fresh water species of this genus; that the desmids that he had studied on specimens of aquatic phanerogams, collected long ago by B. D. Greene, indicated that the algal flora of Massachusetts was of almost a tropical character, and that fresh water species of *Chaetomorpha* were to be expected here. The characterization of Massachusetts as subtropical strikes one rather oddly, but here is this second station for *C. Chelonum*, the same Round Pond where Greene collected the plants that Lagerheim examined in the herbarium in Sweden, and from which he published his very valuable list of desmids; I had been exploring many ponds all over New Eng-

land, but only at this one spot had I found the *Chaetomorpha*; there could hardly be a more perfect fulfillment of what seemed an improbable prophecy.

Malden, Massachusetts.

RUPTURE OF THE EXOPERIDIUM IN CALOSTOMA RAVENELII.

Harley Harris Bartlett.

The most interesting find on a recent collecting trip to Falls Church, Virginia, in company with Dr. Heinrich Hasselbring, was a colony of *Calostoma Ravenellii* (Berk.) Massee. There were between thirty and forty plants, in all stages of development, growing up through a clump of moss in moderately damp, chestnut woods. The long coralline bases of the fungus were imbedded in loose, sandy soil underneath the moss. Most of the peridia had pushed entirely through the moss, but a few had reached maturity under ground.

The method of rupture of the exoperidium in *Calostoma Ravenelii* seems never to have been satisfactorily described, although the species is found not uncommonly near Washington, D. C., and elsewhere. The following quotations from recent treatments of Calostoma (Mitremyces), bear upon this point:—

"....exoperidium remaining attached to the ochraceous endoperidium in the form of irregular warts or scales."

"Although Morgan considers the species [*C. Ravenelii*] synonymous with *M. lutescens*, it appears to differ in....the peculiar mode of rupture of its exoperidium, which remains attached in scale-like fragments all over the surface of the endoperidium, the Herbarium Curtis specimens agreeing in this respect with those of Berkeley, as figured by Massee,...."

(Burnap, Bot. Gaz. xxiii (1897) p. 190.)

"Professor Beardsley writes me: '*Mitremyces Ravenelii*, as I have found it in a dozen stations at Asheville, has no gelatinous coat, but is always covered with a scurfy coat which breaks away from the base first, the last piece separating like a cap from the apex.'"

"Exoperidium breaking into very small flakes, which usually dry up and remain attached to the inner peridium....At least in our herbarium specimens, this is a very constant character....Endoperidium....usually rough with adnate scales, remains of the exoperidium."

(Lloyd, Myc. Notes, No. 13 (1903), pp. 123 & 126.)

"The outer peridium of *Mitremyces* is of the nature of a more or less gelatinous volva,.... It presents three types. In *cinnabarinus, insignis* and *lutescens,* it separates from the endoperidium leaving the latter relatively smooth. In *Ravenelii, Tylerii, orirubra* and *Junghuhni* it breaks into areas and dries more or less as scales on the endoperidium. In *fuscus* it falls off as a cap."

(Lloyd, Myc. Notes, No. 20 (1905), p. 238.)

In essentials, my own observations at Falls Church confirm those of Professor Beardsley. In dry weather, at least, the exoperidium is not noticeably gelatinous. It is thinnest near the foot-stalks, and thickest in a zone around the mouth. As a result of this differentiation the lower part has too little tensile strength to cohere when shrinkage takes place at maturity. Instead, it breaks into small patches which adhere to the endoperidium,— a character well shown by herbarium specimens. The upper part, however, is thicker and tougher, so that it tears away entire from the upper third or fourth of the endoperidium and drops off as a cap, or as a stellately laciniate plate, leaving a glabrous zone around the mouth. There was a detached cap lying near each mature plant in the colony of *Colostoma Ravenelii* at Falls Church. The brilliant coloring of these caps, inside up on the green moss, was what attracted my attention to the colony. They are vermilion at the center, surrounded by strongly contrasting yellow.

Bureau of Plant Industry,
U. S. Department of Agriculture,
Washington, D. C.

Plants new to Vermont.— The Vermont Botanical Club held a two day's field meeting July 6–7, 1909, with headquarters at Burlington. The first day was given to Au Sable Chasm, New York, and the second day to the interesting botanizing regions about Burlington, *viz*: the sandy beaches and rocky bluffs of Lake Champlain, the old river bed at High Bridge, and Woodwardia Pond at Fort Ethan Allen.

The last day, along the Rutland Railroad tracks a clump of perhaps a dozen plants of the low hop clover, *Trifolium procumbens* L., was found by myself. Mr. George L. Kirk later reported the finding of one plant of this clover in the lumber yards, on the same trip.

Later in July, I found six good-sized plants of a western evening primrose, *Oenothera serrulata* Nutt., along the same track. These two are plants new to the state.

A new station for the meadow rue, *Thalictrum confine* Fernald, reported by Dr. J. A. Cushman from North Hero[1] and found at Gardner's Island, Lake Champlain, by Mr. Kirk, was rediscovered at Burlington Bay the second day of September. Prof. M. L. Fernald, to whom I sent specimens, says, "It is singularly undeveloped for this season of the year. On the St. John and the St. Lawrence, it flowers in June and July and the fruit is usually too ripe to collect by the middle of August. It will be interesting to know whether it develops good fruit at this season of the year."

The latter part of September *Gypsophila muralis* L. and *Sedum telephioides* Michx. were found in Colchester. The first was abundant in what seemed to have been a garden or cultivated place and of the last one clump had escaped to the roadside. Both were growing in sandy soil.— Nellie F. Flynn, Burlington, Vermont.

A Remarkable Form of Kalmia latifolia.— While returning from a botanical excursion with members of the Springfield Botanical Club in June, 1907, the writer with others noticed a curious form of Kalmia growing beside the road in Leverett not far from Mt. Toby. The corolla, instead of being of the customary saucer shape, was divided completely into five or more narrowly linear or in some cases even thread-shaped petals, giving the plant a unique appearance.

Some years ago a similar plant was discovered by Miss Bryant at South Deerfield. These were submitted to Dr. Asa Gray, who described them under the title "Dialysis with Staminody in Kalmia latifolia," in the American Naturalist, Vol. IV, pages 373 and 374, 1871.

Prof. C. S. Sargent, in "Garden and Forest," Vol. II, pages 452 and 453, also describes and figures this curious monstrosity, which was procured from Deerfield and cultivated in the Arnold Arboretum.

[1] Vt. Bot. Cl. Bull. iii. 54 (1908).

He mentions that the plant produces seed freely in cultivation and can be propagated by grafting on Kalmia.

Dr. Gray mentions the resemblance of some of these petals to filaments, and says this resemblance goes further, for most of them are actually tipped with an imperfect anther. This we did not notice in our specimens.

Undoubtedly this sport is not confined to one locality, and further search may reveal other plants of this interesting form.— George E. Stone, Amherst, Massachusetts.

Scirpus lineatus in New Hampshire.— On July 20, while collecting at Manchester, N. H., in a damp field where species and forms of *Scirpus*, especially of the *cyperinus* group, are abundant, I found a single tuft of *S. lineatus* Michx, not as yet reported, I think, east of Vermont. Among indigenous plants of the locality are *Lycopodium inundatum* L., *Eleocharis tenuis* (Willd.) Schultes., *Carex stipata* Muhl., *C. stellulata* Good., *Juncus filiformis* L., *Spiranthes cernua* (L.) Richard., *Liparis Loeselii* (L.) Richard. and *Drosera rotundifolia* L. Doubtless the species may be found elsewhere in New Hampshire where similar ecological conditions prevail.— F. W. Batchelder, Manchester, New Hampshire.

Vol. 11, no. 129, including pages 165 to 180 and plates 80 and 81, was issued 29 September, 1909.

Gray's New Manual of Botany — 7th Edition

An illustrated flora of the Northern United States and Canada east of the 96th meridian. By ASA GRAY, LL.D., late Professor of Natural History, Harvard University. Thoroughly revised and largely rewritten by BENJAMIN LINCOLN ROBINSON, Ph.D., Asa Gray Professor of Systematic Botany, and MERRITT LYNDON FERNALD, S.B., Assistant Professor of Botany, Harvard University, assisted by specialists in certain groups. With more than nine hundred text figures.

Regular Edition. Cloth, illustrated, 8vo 928 pages. Price, $2.50.
Tourist's Edition. Limp leather, 5×7½ inches. Price, $3.00.

AMERICAN botanists, who have been impatiently awaiting the revision of this indispensable work, will be delighted to know that a seventh, completely revised, and copiously illustrated edition, is now ready. The revision has entailed years of work by skilled specialists. No effort or expense has been spared to attain the highest degree of clearness, terseness, and accuracy. The plant families have been rearranged in a manner to show the latest view of their affinities, and hundreds of species have been added to the flora. The nomenclature has been brought into thorough accord with the important international rules recently established — a feature of great significance. Indeed, the Manual is the only work of its scope which in the matter of nomenclature is free from provincialism and rests upon a cosmopolitan basis of international agreement. Nearly a thousand figures have been added, and scores of brief and lucid keys have been introduced in a manner which greatly simplifies the problem of plant identification. The work has been extended to include Ontario, Quebec, and the maritime provinces of Canada.

AMERICAN BOOK COMPANY
New York Cincinnati Chicago Boston

HOME GROWN LILIES.

Fresh from Beds. Wild Flowers, Hardy plants of all kinds.
Send for catalogue.

F. H. HORSFORD, Charlotte, Vt.

BIRDS OF MAINE

is the latest and most complete work on northeastern bird life. It is an illustrated work of 693 pages and contains descriptions of the plumage and full accounts of the nests, eggs, habits and general home life of 327 species of birds. As a book for the amateur or for the scientific student of bird life in northeastern America it is unexcelled. Sent prepaid on receipt of price, $3.50. Address all orders to

ORA WILLIS KNIGHT, 84 Forest Avenue, Bangor, Maine.

CAMBRIDGE BOTANICAL SUPPLY COMPANY,
WAVERLEY, MASS.
BOTANICAL SUPPLIES OF EVERY DESCRIPTION.
Samples of Driers and Mounting Papers sent on request.
ASK FOR NEW CATALOG, NO. 91.
STANDARD MATERIAL. IMMEDIATE SHIPMENT.
Physiological Instruments. How do Plants Work?

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB.

Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS
MERRITT LYNDON FERNALD } Associate Editors.
HOLLIS WEBSTER

WILLIAM PENN RICH
EDWARD LOTHROP RAND } Publication Committee.

Vol. 11. November, 1909. No. 131.

CONTENTS:

A new Variety of Abies balsamea. *M. L. Fernald* . . 201

Flora of the Boston District,—V. 204

The Fruit of Lonicera caerulea. *Alfred Rehder* . . . 209

Key to Cladonia in New England. *L. W. Riddle* . . . 212

Lists of New England Plants,—XXIII. *L. W. Riddle* . . 215

Scirpus Smithii in Massachusetts. *M. L. Fernald* . . 220

Boston, Mass.
1052 Exchange Building.

Providence, R. I.
Preston and Rounds Co.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price $1.00 per year ($1.25 to all foreign countries including Canada); single copies 15 cents. Volume 1, $2.00, Vol. 2, $1.50. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

B. L. ROBINSON, 3 Clement Circle, Cambridge, Mass.

Subscriptions, advertisements, and business communications to

W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

Single copies may be had from

E. L. RAND, Corresponding Sec'y N. E. Botanical Club,
1052 Exchange Building, Boston, Mass.

Entered at Boston, Mass., Post office as Second Class Mail Matter

---

SYNOPTICAL FLORA OF NORTH AMERICA, by A. GRAY and others. Vol. I. Fascicles 1 and 2. A critical treatment of forty-five families of polypetalæ (*Ranunculaceæ to Polygalaceæ*) 1895-1897. $5.20.—GRAY HERBARIUM of Harvard University, Cambridge, Mass.

KEY TO NEW ENGLAND TREES, Wild and Commonly Cultivated, based primarily upon leaf characters, by J. FRANKLIN COLLINS and HOWARD W. PRESTON. Price 40c. net. PRESTON & ROUNDS CO., Providence, R. I.

WASHINGTON'S FLORA.

A few complete sets and some incomplete ones of my Fascicle XII of Washington Plants are still on hand; also specimens of many species distributed in earlier fascicles. Send for lists.

W. N. SUKSDORF - - Bingen, Wash., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collectors' memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3-4 in. *1 year $4.00, 6 months $2.50.*

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 11. November, 1909. No. 131.

A NEW VARIETY OF ABIES BALSAMEA.

M. L. Fernald.

Early in August, 1907, while botanizing in eastern Quebec, the writer became much interested in two varieties of the Balsam Fir, *Abies balsamea,* which differed so strikingly in their cones as to attract his instant attention. On the slopes of Mt. Ste. Anne and Percé Mt., near the tip of the Gaspé Peninsula, the two trees are both abundant and they were there first noticed in looking from a high level across the tops of the Firs. In attempting to distinguish in the landscape the spire-like tops of the White Spruce (*Picea canadensis*) the Black Spruce (*Picea mariana*), and the Fir (*Abies balsamea*), Professor J. F. Collins and the writer were puzzled by the unusual appearance of many of the trees. Though obviously Firs their summits at that season had a peculiar whitish misty appearance which distinguished them in the forest from the ordinary *Abies balsamea* as figured, for example, in Sargent's Silva (xii. t. 610). Upon felling one of the trees the source of the unusual whitish appearance (quite different from that produced by pitch) was revealed, for in all the cones the thin wide-spreading awns and sometimes the broad erose and emarginate tips of the bracts were still exserted beyond the thick dark scales. In the ordinary *A. balsamea* the pale membranous bracts, during the flowering season, are much longer than the firmer dark scales, but the latter quickly develop and by July much exceed their subtending bracts and those above. This was the condition in the trees upon Percé Mt. which we had picked out, without question, as the familiar *A. balsamea.* During the remaining two weeks of our stay at Percé the Firs were closely watched and it was found that the two trees were readily distinguished near at hand (and, by the aid of a glass, in the distance).

Many attempts to correlate slight differences of foliage with the peculiarity of the cones showed that both trees had the same trivial variations in the needles and that only in the comparative length of the scale and its subtending bract were the trees separable.

The cones secured at Percé were not mature and it was felt that, although the two trees were growing side by side and under conditions which indicated the same state of development, there still remained the slight possibility that, as the season advanced, the cone-scales would further elongate and obscure the difference which was so conspicuous in mid-summer. The material was consequently pigeon-holed until further observations could be made. During the past summer, therefore, while spending some weeks with Professor K. M. Wiegand in eastern Washington County, Maine, the writer was pleased to find the same two variations of the Fir. There, however, the trees, though ordinarily distinct, showed more intergradation in the length of their bracts than was observed at Percé, indicating that they were to be considered varieties of one species rather than specifically distinct. Again the cones when observed were not fully mature, but this difficulty has been happily overcome, for through the kindness of Miss Mary Deane Dexter the writer has received the top of a fruiting tree collected at Winter Harbor, Hancock County, Maine, on September 25th. This material sent by Miss Dexter is fully mature and the cone-scales are rapidly falling. All but the uppermost scales are equalled or exceeded by the divergent awn of the subtending bract so that the awns appear wide-spreading and stand out 1 to 5 millimeters from the cone. This prominence of the awn is due not so much to the fact that it equals or exceeds the subtended scale as to the failure of the scale next below to cover it. Material from another station has also come to hand. This is a fruiting sprig with disintegrating cones sent from Monhegan Island on September 6, by Mrs. Edwin C. Jenney to Edward L. Rand, Esquire, as "a Fir which puzzles us because of the bristles on the cones." Mrs. Jenney writes further: "The tree had evidently been blown over some years back and was growing in a horizontal position. In spite of this fact it is a large and healthy-looking tree. We wondered very much about the cones, never having noticed any with the extended awns before."

In searching the literature of the subject the writer finds that *Abies balsamea* is sometimes described as having the bracts "shorter than the scales or rarely longer," but his own experience in the field and these

recent observations by others lead him to the conviction that the tree in which the awns of the bracts are so obvious in fully grown cones should be separated varietally from the ordinary form of the species. Comparison of the scales of disintegrated mature cones shows that in the typical *A. balsamea* the bract (including the erect awn) is ordinarily about two thirds as long as the lamina of its subtended scale, though varying from three sevenths to five sixths as long; while in the variety with divergent exserted awns the bract is ordinarily as long as, and occasionally a little longer than its subtended scale; and that in general the variety has slightly smaller cones than the typical form of the species.[1] On account of these characteristics of the cones the tree is here proposed as

Abies balsamea (L.) Mill., var. **phanerolepis**, n. var., strobilis subcylindraceis; laminis ovuliferis maturis suborbicularibus vel reniformibus 8–13 mm. longis; laminis membranaceis 8–13 mm. longis, cuspide patenti exserta.

Strobils subcylindric: mature laminas of the ovuliferous scales suborbicular or reniform, 8–13 mm. long; of the membranaceous bracts 8–13 mm. long, with a spreading exserted awn: otherwise as in the typical form of the species.— Quebec, slopes of Percé Mt., Percé, Gaspé County, August 3, 1907 (*Fernald & Collins*, no. 860): Newfoundland, cool damp soil, Channel, July 27–August 1, 1901; damp woods, near Topsail, Conception Bay, August 12–19, 1901 (*Howe & Lang*, nos. 975, 1303): Maine, Pembroke, July 23, 1909 (*Fernald*); Grindstone Neck, Winter Harbor, September 25, 1909 (*Miss Mary Deane Dexter*) Monhegan Island, September 6, 1909 (*Mrs. Edwin C. Jenney*).

This may well be the variation of *Abies balsamea* which has given rise to the report at various times of *A. Fraseri* from New England. In that southern species, however, the cones are more ovoid and the bracts are very much longer than the scales and have strongly recurved broad tips. In Loudon's Encyclopedia of Trees and Shrubs there is a fairly characteristic figure (fig. 1953) of the cone of var. *phanerolepis*, indicated as an illustration of *Picea balsamea*.

Gray Herbarium.

[1] Measurements of mature scales of *A. balsamea*, taken at random from many cones, show the laminas of the scales to range from 11 to 15 mm. in length, with a mean of 12.8 mm.; and the laminas of the bracts (including the awn) to range from 6 to 10 mm. in length, with a mean of 8.5. Similar measurements of the scales of the variety show the laminas to vary from 8 to 13 mm. in length, with a mean of 11 mm.; and the laminas of the bracts to be of essentially the same length.

REPORTS ON THE FLORA OF THE BOSTON DISTRICT,—V.

In preparing this list, it seemed to the committee that records of early collections would add to its value and interest, even where the species are common ones. Accordingly all existing specimens collected before 1860 have been mentioned.

There has been very little done in collecting Potamogetons within recent years. Fresh Pond, Cambridge, and Mystic Pond, in Medford and Winchester, have been changed so much that the stations formerly reported there are probably in many cases extinct. The ponds in Wenham should be revisited, however, and there is no reason why other sheets of water favorably located, should not also be productive.

TYPHACEAE.

TYPHA.

T. angustifolia L. Swamps and salt-marshes near the coast. Swampscott (Aug. 18, 1902, comm. Susan Minns). Abundant locally near Boston.

T. latifolia L. Swamps, abundant throughout.

Where the two species grow together there are all kinds of intermediate forms. This is especially noticeable in the big swamps at West Cambridge.

SPARGANIACEAE.

SPARGANIUM.

S. americanum Nutt. Muddy bottoms of streams and ponds in shallow water; fairly well distributed throughout.

S. americanum Nutt., var. **androcladum** (Engelm.) Fernald & Eames. Growing with the type; very abundant. There are two specimens of this variety in the Gray Herb., collected respectively at Beverly in 1856, and in Fresh Pond, Cambridge in 1857 by Asa Gray.

S. angustifolium Michx. Spot Pond [Middlesex Fells] (*Wm. Boott*, Aug. 20, 1865. Specimen in Gray Herb.); Crane Pond, West

Newbury (*J. Robinson*, Aug. 13, 1879); shallow water, common, Ponkapaug Pond, Canton (*J. R. Churchill*, July 26, 1884). This species probably occurs sparingly throughout.

S. diversifolium Graebner. Bogs and muddy shores, Beverly, Sharon, Stoneham, Concord, Wellesley, Natick, Framingham, Hyde Park, Quincy and Randolph.

S. diversifolium Graebner, var. **acaule** (Beeby) Fernald & Eames. See RHODORA, x. 56. 1908. "In running water in muddy-sandy brook. The station (where the plants are rather plenty) is in a warm open meadow. Near State Muster Grounds, South Framingham" (*A. J. Eames*, Sept. 7, 1907); Bridgewater (*E. W. Sinnott*, September, 1908).

S. eurycarpum Engelm. Muddy shores and shallow water, frequent.

S. fluctuans (Morong) Robinson. Ponkapaug Pond, Canton (*J. R. Churchill*, July 26, 1884); in two feet of water, Whitehall Pond, Woodville, Hopkinton (*T. Morong*, Sept. 15, 1887).

S. lucidum Fernald & Eames. Small pond, pasture, close to the road, Medford (*Wm. Boott*, July 29, 1860. One of the type specimens in Gray Herb.); very abundant on muddy shore of Heard Pond, Wayland (*A. J. Eames & C. H. Knowlton*, Sept. 6, 1909).

S. minimum Fries. Spot Pond, Middlesex Fells, in good fruit (*Wm. Boott*, Aug. 31, 1854. Specimen in Gray Herb.); Waushakum Pond, Ashland (*T. Morong*, July 14, 1881; Aug. 7, 1883; Sept. 5, 1887. "Does not fruit here freely, but propagates more by rootstocks.")

NAJADACEAE.

NAJAS.

N. flexilis (Willd.) Rostk. & Schmidt. Shallow water of ponds or slow streams, on sandy or muddy bottoms, common throughout. Collected in Spot Pond, Stoneham, by Wm. Boott, Aug. 31, 1854.

N. flexilis (Willd.) Rostk. & Schmidt, var. **robusta** Morong. "In four feet of water, reaching nearly to the surface, Sudbury River, Concord" (*T. Morong & W. Deane*, Aug. 4, 1886).

N. gracillima (A. Br.) Magnus. Ponds; North Andover, Stoneham, Winchester, Woburn, Mystic Pond. Collected in Winchester by Wm.

Boott, Aug. 23, 1853. "In a springy bog at Sluice Pond, Lynn, 1880" (*E. Faxon*, according to Robinson, Fl. Essex Co. 104. 1880); Ashland (*T. Morong*, according to Dame & Collins, Fl. Middlesex Co. 99. 1888).

POTAMOGETON.

P. americanus C. & S. Running water, occasionally in ponds; Hyde Park, Natick, Topsfield, Winchester, Mystic Pond.

P. amplifolius Tuckerm. Ponds and rivers, frequent in northern half of district, also occurring in Canton.

P. angustifolius Berchtold & Presl. Fresh Pond, Cambridge, (*J. W. Robbins*, Oct. 2, 1851; *Wm. Boott*, Sept. 5, 1853; collected by other botanists down to 1886); Mystic Pond (*Wm. Boott*, Aug. 26, ——); Pleasant Pond, Wenham (various collectors between 1875 and 1884). First two stations probably extinct.

P. bupleuroides Fernald. Fresh and brackish ponds; Cambridge, Lynn, Natick, Wakefield, Wellesley, Wenham, Mystic Pond.

P. CRISPUS L. Pools and ditches among the clay-pits in Cambridge, abundant; also in Spy Pond, Arlington.

P. dimorphus Raf. Ponds and streams, common north and west, but no reports south of Canton.

P. epihydrus Raf. Ponds and streams; many records from all parts of the district.

P. foliosus Raf. Still waters, from scattered stations in eastern half of district.

P. gemmiparus Robbins. Rivers and ponds. Charles River at Dedham and South Natick; Neponset River at Dedham; Fresh Pond, Cambridge; Wenham Pond, Wenham; Mystic Pond (*E. Tuckerman*, according to Dame & Collins, Fl. Middlesex Co. 101. 1888).

P. heterophyllus Schreb. Ponds and streams; numerous stations in northern half, and as far south as Canton.

P. heterophyllus Schreb., forma **graminifolius** (Fries) Morong. Ponds, Stoneham, Cambridge, Wellesley, Natick, Ashland.

P. heterophyllus Schreb., forma **maximus** Morong. Deep running water, Charles River, Natick (*T. Morong*, July 14, 1879 and Sept 5, 1882); Charles River, Dedham (*E. & C. E. Faxon*, Aug. 2, 1880).

P. heterophyllus Schreb., forma **myriophyllus** (Robbins) Morong. Ponds, from six scattered stations in north and west portion.

P. hybridus Michx. Still water, many stations in northern half of district, also occurring in Pembroke. Collected in Roxbury, "near Morlands," Aug. 10-15, 1820; in Peabody by J. L. Russell, August, 1854; and in Mystic Pond by Wm. Boott, Aug. 15, 1858.

P. lateralis Morong. Charles River, Dedham (*Wm. Boott* and *E. & C. E. Faxon*, July 13, 1879; *T. Morong*, July 16, 1880; *E. & C. E. Faxon* and *T. Morong*, Aug. 2, 1880).

P. lucens L. Fresh Pond, Cambridge (several collectors between 1865 and 1886); Wenham Pond, Wenham (*J. W. Robbins*, no date; *Wm. Boott*, Sept. 20, 1867); Pleasant Pond, Wenham (*J. Robinson*, Aug. 13, 1875); Winchester (*L. L. Dame*, according to Dame & Collins, Fl. Middlesex Co., 100. 1888).

P. mysticus Morong. Mystic Pond (*T. Morong, E. & C. E. Faxon* and *Wm. Boott*, various collections between 1865 and 1881); Wenham Pond, Wenham (*E. & C. E. Faxon*, Sept. 13, 1880 and Sept. 5, 1882).

P. natans L. Ponds and slow streams; many stations, running as far south as Canton.

× **P. nitens** Weber. Wenham Pond, North Beverly (*E. & C. E. Faxon*, Sept. 13, 1880, and Sept. 5, 1882; *T. Morong & W. Deane*, Sept. 8, 1886).

P. Oakesianus Robbins. Ponds; Beverly, Dedham, Lynn, Natick, Stoneham, Woburn. Mystic Pond, Medford (*Wm. Boott*, according to Dame & Collins, Fl. Middlesex Co., 99. 1888).

P. obtusifolius Mertens & Koch. Ponds and streams; Newbury, Wenham and Natick.

P. praelongus Wulf. Fresh Pond, Cambridge (various collectors between 1865 and 1881); Pleasant Pond, Wenham, 1875 and 1880.

P. pulcher Tuckerm. Ponds, streams and ditches; scattered stations from all parts of district except the northwest and south.

P. pusillus L. Ponds and streams; frequent, but no records from extreme northern and southern portions.

P. pusillus L., var. **polyphyllus** Morong. Foster's Pond, Andover (*A. S. Pease*, Sept. 11, 1903); Fresh Pond, Cambridge (*E. & C. E. Faxon*, July 22 & 23, 1880); shallow muddy pool, South Natick (*T. Morong*, Aug. 29, 1879); Spot Pond, Stoneham, (*Wm. Boott*, Aug. 20, 1865).

P. pusillus L., var. **Sturrockii** Benn. Woburn Brook (*Wm. Boott*, Aug. 25, 1867); Lake Cochichewick, North Andover (*A. S. Pease*, Sept. 24, 1903).

P. pusillus L., var. **tenuissimus** Mertens & Koch. Ponds and streams; eight scattered stations north and west of Boston.

P. Robbinsii Oakes. Deep water of ponds and streams; reported from thirteen stations north and west of Boston.

× **P. spathaeformis** Tuckerm. Mystic Pond, Medford; collected between 1865 and 1881 by Wm. Boott, E. Tuckerman, T. Morong and C. E. Faxon. See Fernald, Rhodora, viii. 224. 1906.

P. strictifolius Benn. Mystic Pond (*Wm. Boott*, Aug. 13, 1865).

P. Vaseyi Robbins. Mystic Pond (*Wm. Boott*, Aug. 6, 1865); Spot Pond, Stoneham (*T. Morong*, July 27, 1876; *L. H. Bailey*, Aug. 1, 1883).

P. zosterifolius Schumacher. Rivers and ponds; Cambridge, Canton, Lynnfield, Natick, Newbury, Wenham.

RUPPIA.

R. maritima L. Shallow brackish and salt water, along the coast.

ZANICHELLIA.

Z. palustris L. Brackish water, Ipswich; Mystic River and Mystic Pond, Medford, between 1865 and 1887; Squantum, Quincy; Revere; Salem.

Z. palustris L., var. **pedunculata** J. Gay. Seashore near Boston (*L. H. Bailey*, Aug. 25, 1883).

ZOSTERA.

Z. marina L. In shallow salt water, generally below low tide; common and abundant along the entire coast.

JUNCAGINACEAE.

SCHEUCHZERIA.

S. palustris L. Bogs and ponds, Acton, Canton, Lynn, Natick, Peabody, rare. Wm. Boott collected this species at Tewksbury on June 23, 1853. Specimen in Gray Herb.

TRIGLOCHIN.

T. maritima L. Salt marshes, common. This species was collected by Wm. Boott on the "Brookline R. R." on May 26, 1854.

C. H. Knowlton
J. A. Cushman
Walter Deane
A. K. Harrison
} *Committee on Local Flora.*

NOTE ON THE MORPHOLOGY OF THE FRUIT OF LONICERA CAERULEA.

Alfred Rehder.

It seems strange that such a widely distributed and well known plant as *Lonicera caerulea* should be so little known in regard to the morphological structure of its fruit, that even in the most recent manuals and floras as well of this country as of Europe the description of the ovaries and fruits is incorrectly given. The fruit is described everywhere as consisting of two connate berries, but a dissection will show at once, even without the aid of a magnifying glass, that this is not the case; the ovaries are entirely separated from each other and remain so until maturity, the bractlets, however, are united into a cupula tightly enveloping the ovaries the whole thus presenting the appearance of perfectly united ovaries without bractlets which in fact are generally described as wanting.

There have been a few botanists who described correctly the ovaries and fruits of this Lonicera, but their statements were overlooked and the old erroneous conception based on superficial observation has remained the current one until today. The first correct description as far as I know was given by Petermann in 1849 (Deutschlands Flora 260, pl. 41, fig. 323, R–T) as follows: Die vier Deckblättchen zu einer die zwei Fruchtknoten eng und gänzlich umschliessenden und endlich zugleich beerenartig werdenden Hülle verwachsen und so nur einen Fruchtknoten darstellend [The four bractlets connate into a cupula enclosing tightly and completely the two ovaries and finally becoming

berrylike, thus simulating only one ovary]; the accompanying figures give a fair illustration of these facts. All of the later writers seem to have overlooked Petermann's statement, until in 1893 Koehne in his Deutsche Dendrologie 545, fig. 96, K) again describes and figures correctly the ovaries apparently without knowing of Petermann's publication; one of his drawings had been published already two years before in Engler & Prantl's Natürliche Pflanzenfamilien (Teil 4, Abteil. 4, p. 167, fig. 57, E), but in the accompanying text Fritsch describes the berries as completely connate. In 1903 I described and figured the fruit in my Synopsis of the genus Lonicera (Rep. Missouri Bot. Gard. XIV. 67, pl. 1, fig. 10–11). Maximowicz in his revision of the Loniceras of Eastern Asia (Bull. Acad. Sci. St. Pétersb. XXXI, 58. 1886) observed the true state of the fruit of *Lonicera caerulea* in a Japanese form, but failed to recognize its identity with *L. caerulea* which he describes in the usual way as having connate ovaries, and published this Japanese form on account of its peculiar bracts as a new species under the name of *L. emphyllocalyx*, the name apparently referring to the large bractlets enclosing the ovaries up to the calyx.

The true character of the fruit is also disclosed by a variety named by Regel *L. caerulea* var. *angustifolia* (Russkaya Dendr. 144. 1873) which shows the tendency at least in the plant cultivated at the Arnold Arboretum, to have the cupula more or less distinctly lobed and sometimes shorter than the ovaries so as to expose partly the latter. We have here again a case where a teratological aberration reveals the true morphological character of parts whose morphological origin seems doubtful.

Lonicera caerulea is the only species of the whole genus containing about 165 species in which the cupula grows with the ovaries into a collective fruit and becomes juicy and colored at maturity. It forms thus a very distinct group by itself. In the allied section *Chlamydocarpi* the cupula and ovaries are in a young state exactly like those of *L. caerulea*, but the cupula does not become fleshy and splits at maturity disclosing the red berries. From this section the *Vesicariae* of Komarov do not differ; they were supposed to have a cupula adnate to the base of the calyx and growing with the ovaries into a rather dry collective fruit. This, however, is not the case, as good and complete material which I had recently the opportunity to examine, has shown. Franchet who first made the erroneous statement in regard to his *L. Ferdinandi* and Komarov who made it in regard to his *L. vesicaria* were deceived as well as myself by the fact that the top of the cupula adheres so

firmly to the base of the calyx and the neck of the ovaries by means of a dense matted villous tomentum with which the cupula and the top of the ovary is clothed, that even in thin sections they can only be separated by some force. Furthermore fully ripe fruits were not known at the time of the description of these species and the half-ripe berries had the appearance of a perfectly closed rather dry fruit, while material recently received showed that in both species the cupula splits at maturity and discloses the red berries.

Among the American Loniceras there is no other species which approaches *L. coerulea* in the shape and behavior of the bractlets; the nearest is *L. involucrata*, but in this species the bractlets though very large and growing with the fruits do not form a real cupula, they are only slightly connate and subtend, but do not enclose the berries. Among the Old World species, however, all intermediate states can be found from species with four small completely separate bractlets to species with a perfect cupula tightly enclosing the ovaries. There is even a species, *L. Griffithii* Hook. f. & Thoms., belonging to the subgenus *Periclymenum* in which all the bractlets of a whorl of six flowers are connate into one common cupula.

A few words may be added here on the morphology of the inflorescence in the genus *Lonicera*. The inflorescence is a simple three-flowered cyme with the central flower suppressed in the subgenus *Chamaecerasus*, while in the subgenus *Periclymenum* (*Caprifolium*) all three flowers are developed and the flowers of the two opposite sessile cymes form here six-flowered whorls. Each flower has two prophylls. The prophylls of the central flower bearing in their axils the two lateral flowers are called bracts; they are always present, though in a few cases as in *L. oblongifolia* and *L. conjugialis* very minute and caducous; in shape they vary from subulate to foliaceous. The prophylls of the lateral flowers of which there are four in each cyme, two for each flower, are designated as bractlets; they are generally roundish in outline and usually partly connate in various ways and different degrees, less often perfectly separate and sometimes entirely wanting or only recognizable as minute tubercles at the base of the ovaries. In most species of the subgenus *Periclymenum* and in a few other species the leaves subtending the cymes become bractlike, but must not be confused with the real bracts and bractlets.

Arnold Arboretum.

A KEY TO THE SPECIES AND PRINCIPAL VARIETIES OF CLADONIA OCCURRING IN NEW ENGLAND.

LINCOLN WARE RIDDLE.

ONE of the most urgent needs in the study of lichens at the present time is a set of keys to the larger genera. So far as I am aware no key to the New England species of *Cladonia* has ever been published. It is to contribute toward filling this need that the following key is here offered. It is based on the study of an extensive series of specimens, and has been tested by several students, both inexperienced and experienced. Yet, in a genus where the species are as variable as in Cladonia and where such puzzling transitional forms occur, it is not to be expected that any key can be constructed that will serve for the determination of all specimens. It is hoped, however, that with material which is fairly typical, satisfactory results may be obtained. For the authors and synonymy of the species given, reference may be made to the check-list to be found on pages 215 and 216.

Sect. I. Primary thallus persistent and crustaceous. Podetia short (mostly under 1 cm.), club-shaped, simple or branched, apothecia pale brown, poorly developed. . . . . *C. papillaria*

Sect. II. Primary thallus squamulose when present, often disappearing.

Sub-Sect. 1. Squamules when present medium-sized to small, whitish on under side. (For Sub-Sect. 2, see end of key).

Series 1. Apothecia red. (Rarely the species of this series may have pale yellowish-brown apothecia, a condition known as var. *ochrocarpia*.)

A. Podetia cylindrical, without cups.

B. Green to yellow, smooth to warty, never sorediate.

C. Simple below, sparingly branched above.

D. Podetia reduced, squamules of thallus sorediate *C. cristatella* v. *paludicola*

DD. Podetia well-developed, thallus not sorediate.

E. Podetia with few squamules or none. . . . . *C. cristatella*

EE. Podetia densely squamulose. . . . . *C. cristatella* v. *vestita*

CC. Podetia branched throughout. . . . . *C. cristatella* v. *ramosa*

BB. Grayish, powdery-sorediate.

C. Thallus scanty, podetia rarely squamulose.

D. Podetia stout, sparingly branched, KOH + . . . *C. macilenta*

DD. Podetia slender, simple, KOH − . . . . . *C. bacillaris*

CC. Thallus well-developed, podetia short, squamulose, decorticate between the squamules. . . . . *C. didyma*

AA. Podetia cup-bearing.

B. Podetia medium-sized (mostly 2 cm. or less).

C. Podetia white-powdery-sorediate, cup with incurved margins, commonly proliferating. . . . . *C. digitata*

CC. Podetia warty or granulate-sorediate, cups dilated, rarely proliferating. . . . . *C. coccifera*

BB. Podetia elongated (mostly 4 cm. or over), yellowish.
C. Podetia sulphur-powdery, never squamulose.... *C. deformis*
CC. Podetia smooth and densely squamulose...... *C. bellidiflora*

Series 2. Apothecia brown.
A. Podetia cylindrical, without cups.
B. Podetia simple or nearly so, primary thallus usually persistent.
C. Podetia absent or thickly squamulose.
D. Podetia absent or nearly so, squamules coarse *C. caespiticia*
DD. Podetia evidently present, squamules fine, often servediate.
E. Podetia short (1 cm. or less)............ *C. delicata*
EE. Podetia taller (2 cm. or more).......... *C. decorticata*
CC. Podetia present and with few squamules or none.
D. Corticate, without soredia or granules.
E. Cortex continuous or nearly so.
F. Podetia short (mostly less than 2 cm.).
G. Squamules fine, podetia slender in proportion to the apothecia.......................... *C. mitrula*
GG. Squamules coarse, podetia stouter.
H. Typically simple, KOH + (red)... *C. subcariosa*
HH. Branched above, KOH —... *C. cariosa* v. *corticata*
FF. Podetia elongated (over 3 cm.)
G. Slender, little inflated........ *C. gracilis* v. *chordalis*
GG. Stout, much inflated......... *C. gracilis* v. *elongata*
EE. Cortex fissured, irregular and uneven......... *C. cariosa*
DD. More or less decorticate, servediate, or granulate.
E. Scurfy-granulate......................... *C. pityrea*
EE. Powdery-servediate.
F. Podetia perforate, gray................. *C. glauca*
FF. Podetia not perforate.
G. Podetia whitish throughout.
H. Simple, 2 cm. high or less. . *C. fimbriata* v. *coniocrea*
HH. Sparingly branched, 3 cm. high or more *C. fimbriata* v. *subulata*
GG. Podetia brown below.................. *C. cornuta*
BB. Podetia repeatedly branched and forming more or less intricate masses, thallus mostly disappearing.
C. Podetia corticate, smooth, squamules when present coarse.
D. Yellowish-green, tips fastigiate, blunt....... *C. uncialis*
DD. Grayish or brownish-green, tips dichotomous, acute.
E. Cortex continuous, without soredia.
F. With few squamules or none.
G. Podetia more or less erect, in loose masses.
H. Podetia wholly gray............... *C. furcata*
HH. Brown, especially above... *C. furcata* v. *palamaea*
GG. Podetia intricately intertangled in dense masses *C. rangiformis*
FF. More or less covered with coarse squamules *C. furcata* v. *pinnata*
EE. Cortex broken in places, and servediate especially above *C. furcata* v. *scabriuscula*
CC. Podetia decorticate, squamules when present fine.
D. Podetia without squamules.
E. Ultimate branches recurved, tips blunt... *C. rangiferina*
EE. Ultimate branches more erect, tips acute.
F. Loosely branched, in irregular masses.... *C. sylvatica*
FF. Intricately branched, in dense rounded tufts *C. alpestris*

DD. Podetia covered with fine squamules *C. squamosa* v. *muricella*

AA. Podetia cup-bearing, often proliferating (i. e. branching from the margins of the cup).

B. Cups perforate.

C. Without soredia.

D. With scattered coarse squamules or none.

E. Podetia smooth.

F. Slightly inflated, cups narrow .... *C. crispata*

FF. Much inflated, cups spreading, often becoming leafy *C. turgida.*

EE. Podetia pitted .... *C. reticulata*

DD. Covered with fine squamules .... *C. squamosa*

CC. Gray powdery-sorediate .... *C. cenotea*

BB. Podetia never perforate.

C. Corticate and smooth.

D. Gray or brownish green.

E. Proliferations from margins of cups.

F. Cups regular, squamules few or none...... *C. gracilis* (*C. gracilis* v. *chordalis* & *elongata* may also be sought here)

FF. Cups irregular, podetia squamulose *C. gracilis* v. *dilatata*

EE. Proliferations from center of cup .... *C. verticillata*

DD. Yellowish-green .... *C. amaurocrea*

CC. Podetia warty or decorticate.

D. Powdery-sorediate.

E. Cups regular and simple .... *C. fimbriata*

EE. Cups irregular and proliferous.... *C. fimbriata* v. *radiata*

DD. Not powdery-sorediate.

E. Areolate-warty, cups ample.

F. Simple or nearly so .... *C. pyxidata*

FF. Luxuriantly proliferous .... *C. degenerans*

EE. Scurfy-granulate, cups reduced .... *C. pityrea*

Sub-Sect. 2. Squamules always present, strikingly large, creamy-yellow on under side .... *C. foliacea* v. *alcicornis*

Wellesley College.

PRELIMINARY LISTS OF NEW ENGLAND PLANTS,— XXIII.[1] CLADONIACEAE.

Lincoln Ware Riddle.

[The sign + indicates that an herbarium specimen has been seen; the sign – that a reliable printed record has been found.]

	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
Baeomyces byssoides (L.) Schaer.	+	+	+	+	–	
" ericetorum (L.) Wainio	+	+	+	–		
" placophyllus Ach.		+				
" roseus Pers.	+	+	+	+	+	+
Cladonia alpestris (L.) Rabenh.	+	+	+	+	–	+
" amaurocrea (Flke.) Schaer.	+	+	+			
" bacillaris Nyl.	+	+	+	+		+
" caespiticia (Pers.) Flke.	+	+		+	+	
" cariosa (Ach.) Spreng.	+	+	+	+	–	+
" " var. corticata Wainio	–			+		
" carneola Fr.		+				
" cenotea (Ach.) Schaer.	+	+	+	+	–	
" coccifera (L.) Willd.	+	+	+	+	–	+
" " var. ochrocarpia Flke.		+		+		
" " var. pleurota (Flke.) Schaer.		+		–		
" cornuta (L.) Schaer.		+	+	–	–	
" crispata (Ach.) Flot.	+	+	+	+	–	+
" cristatella Tuck.	+	+	+	+	+	+
" " var. ochrocarpia Tuck.		+		+	+	
" " var. paludicola Tuck.				+		
" " var. ramosa Tuck.		+		+		
" " var. vestita Tuck.	+	+	+	+		
" decorticata (Flke.) Spreng.	–	+				
" deformis Hoffm.	+	+	+	+		
" degenerans (Flke.) Spreng.		+	+	–	+	
" delicata (Ehrh.) Flke.	+	+	+	+		
" digitata Schaer.	+	+		+		
" fimbriata (L.) Fr.	+	+	+	+	+	+
" " var. coniocrea (Flke.) Wain.	+	+	+	+	+	+
" " var. nemoxyne (Ach.) Coem.		+				
" " var. radiata (Schreb.) Coem.		+		+		
" " var. subulata (L.) Wainio		+				

[1] Printed in Rhodora as supplementary matter.

	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
Cladonia foliacea var. alcicornis (Lightf.) Schaer	−	+		+	−	−
“ furcata (Huds.) Schrad.	+	+	+	+	+	+
“ “ var. palamaea (Ach.) Nyl.		+		+	+	+
“ “ var. pinnata (Flke.) Wainio	+	+	+	+		+
“ “ var. scabriuscula (Del.) Coem.	+	+		+	+	
“ glauca Flke.				+	−	
“ gracilis (L.) Willd.	+	+	+	−	−	−
“ “ var. chordalis (Flke.) Schaer.		+	+		−	
“ “ var. dilacerata Flke.	+	+	+			
“ “ var. elongata (Jacq.) Flke.	+	+		+		
“ macilenta Hoffm.	+	+	+	+	+	
“ mitrula Tuck.				+		+
“ papillaria (Ehrh.) Hoffm.	+	+	+	+	+	+
“ pityrea (Flke.) Fr.	+	+	+	+		
“ pyxidata (L.) Fr.	+	+	+	+	+	+
“ “ var. chlorophaea (Spreng.) Flke.	+	+				
“ rangiferina (L.) Web.	+	+	+	+	+	+
“ rangiformis Hoffm.		+				
“ reticulata (Russell) Wainio	+	+		+	+	+
“ squmosa (Scop.) Hoffam.	+	+	+	+		
“ “ var. multibrachiata (Flke.) Wainio.		+		−		
“ “ var. muricella (Del.) Wainio	+	+		−		
“ “ var. phyllocoma Rabenh.	+	+				
“ subcariosa Nyl.	−	+		+		−
“ sylvatica Hoffm.	+	+	+	+	+	+
“ turgida (Ehrh.) Hoffm.	+	+	+	+		
“ uncialis (L.) Web.	+	+	+	+	+	+
“ verticillata Hoffm.	−	+	+	+	+	+
Pilophorus Cereolus var. Fibula Tuck.	−	+				
Stereocaulon alpinum Laur.	+	+				
“ condensatum Hoffm.	−			+		+
“ coralloides Fr.	+	+	+	−		
“ denudatum Flke.		+	+	−		
“ nanodes Tuck.		+				
“ paschale (L.) Ach.	+	+	+	+		+
“ pileatum Ach.	+	+	+	+		
“ tomentosum Fr.	+	+	+	+		+
Thamnolia vermicularis (Sw.) Schaer.	+	+	+			

Notes upon the above List

The names adopted in the genus *Cladonia* are based on Wainio's "Monographia Cladoniarum Universalis." In cases where the nomenclature of Tuckerman's "Synopsis of North American Lichens" differs from that of Wainio, the Tuckerman name is given in parenthesis, in these notes, following the Wainio name. On one point only does the usage here followed depart from that of Wainio. In his Monograph, he has distributed all the forms of polymorphic species under varietal names, making, therefore, a compound conception of the species. This is a practice not followed in other groups of plants and apparently unnecessary. In this list the specific name is understood to stand for the typical form of the species, and is equivalent to the first variety given under each species by Wainio. This is liable to lead to confusion only in the following species: *Cladonia fimbriata*, *furcata*, and *gracilis*. For the synonymy, reference may be made to the notes on these species given below.

Baeomyces ericetorum (L.) Wainio. (*B. aeruginosus* (Scop.) DC.) There is considerable doubt as to the true relationships of this species, but it has seemed best in this list to retain it in its traditional position, using, however, the earlier name. (Compare Wainio: Notulae de synonymia lichenum, in Medd. Soc. pro Fauna et Flora fennica, vol. **14**, 1886.)

Cladonia alpestris (L.) Rabenh. (*Cl. rangiferina* var. *alpestris* (L.) Schaer.)

Cladonia bacillaris Nyl. (*Cl. macilenta* (Ehrh.) Hoffm. in part.)

Cladonia cariosa var. *corticata* Wainio. (*Cl. symphycarpa*, in part, of American authors, not Fries.) Compare Fink in Bryologist **9**:23 (1906).

Cladonia coccifera (L.) Willd. (*Cl. cornucopioides* (L.) Fr.)

Cladonia crispata (Ach.) Flot. (*Cl. furcata* var. *crispata* Flke.)

Cladonia fimbriata (L.) Fr. Under the specific name is included material called "var. *simplex*" by Wainio, "var. *tubaeformis* Fr." by Tuckerman, in part. Tuckerman's "var. *tubaeformis*" also included what is here called "var. *coniocrea* (Flke.) Wain."; and his "var. *radiata* Fr." included the remaining three varieties of this list.

Cladonia foliacea var. *alcicornis* (Lightf.) Schaer. (*Cl. alcicornis* (Lightf.) Flke.) The Maine record is based on Rand & Redfield's "Flora of Mt. Desert Island." Through the courtesy of Mr. E. L.

Rand, I have had the opportunity of examining the lichens preserved in his herbarium. The specimen upon which this record was apparently based is very doubtful, and much better referable to *Cl. cariosa* var. *corticata* Wainio. I have left the record in the list, however, as Mr. Rand states that some of the records of lichens were based on specimens in other herbaria than his own.

Cladonia furcata (Huds.) Schrad. Under the specific name is included the "var. *racemosa* (Hoffm.) Flke." of Wainio's Monograph, and also of Tuckerman, in part. The "var. *racemosa*" of the latter also included material placed by Wainio under "var. *pinnata* (Flke.)." "Var. *palamaea* (Ach.) Nyl." is equivalent to "var. *subulata* Flke." but "var. *scabriuscula* (Del.) Coem." was not recognized by Tuckerman, and appears not to be represented in his herbarium.

Cladonia glauca Flke. (*Cl. cenotea* var. *furcellata* Fr.)

Cladonia gracilis (L.) Willd. The specific name is understood to stand for the "var. *dilatata*" of Wainio, and the "var. *hybrida*" of Tuckerman, in part, the latter also including material here referred to "var. *dilacerata* Flk. "Var. *chordalis* (Flke.) Schaer." is the "var. *elongata* f. *chordalis* Fr." of Tuckerman, and "var. *elongata* (Jacq.) Flke." is the "var. *elongata* f. *macroceras* Fr."

Cladonia pityrea (Flke.) Fr. (*Cl. fimbriata* var. *adspersa* Tuck. in part.)

Cladonia rangiformis Hoffm. (*Cl. furcata* var. *pungens* Fr.)

Cladonia reticulata (Russell) Wainio. (*Cl. Boryi* Tuck.)

Cladonia squamosa (Scop.) Hoffm. The vars. *multibrachiata* and *phyllocoma* of this list have been little studied by American workers, and the records are, therefore, based on material determined by L. Scriba of Frankfort, Germany. "Var. *muricella* (Del.) Wainio" is equivalent to "f. *attenuata* Fr."

Cladonia subcariosa Nyl. (*Cl. gracilis* var. *verticillata* f. *symphycarpia* Tuck., *Cl. symphycarpa*, in part, of American authors, not Fries.) See note below under *Cl. alpicola* var. *Karelica* Wainio.

Cladonia sylvatica (L.) Hoffm. (*Cl. rangiferina* var. *sylvatica* (L.) Schaer.)

Cladonia verticillata Hoffm. (*Cl. gracilis* var. *verticillata* Fr.)

The following species recorded from New England have been omitted from the list for the reasons stated below.

Cladonia bellidiflora (Ach.) Schaer. Recorded as collected in Wells, Maine, by J. Blake in Harvey's "Contributions to the Lichens of

Maine" (Bull. Torrey Bot. Club **21**:389). Through the courtesy of Prof. M. A. Chrysler, I have had an opportunity of examining the specimens upon which this record was based. The specimens are very doubtfully *Cl. bellidiflora,* having a much stronger resemblance to squamulose forms of *Cl. cristatella* Tuck. Similar specimens, collected in the White Mts. by Tuckerman are in the latter's herbarium, marked doubtful.

Cladonia didyma (Flke.) Wainio. (*Cl. pulchella* Schwein.) Recorded in Rand & Redfield's "Flora of Mt. Desert Island, Maine"; but no specimen is to be found in Mr. Rand's herbarium, and as the species is distinctly southern in its distribution and is not otherwise known from New England, the record was probably based on an erroneous determination.

Cladonia flabelliformis (Flke.) Wainio. Recorded by Willey in his "List of the Lichens of New Bedford, Mass.," but not generally recognized by American students as distinct from *Cl. macilenta.*

Cladonia lepidota Fr. Recorded by Willey (*l. c.*). This species is considered by Wainio to be synonymous with *Cl. cristatella* var. *ochrocarpia* Tuck. and the specimens are, therefore, listed under that name.

Cladonia leptophylla Nyl. Recorded by Willey (*l. c.*), but included under *Cl. mitrula* Tuck. by American students.

Cladonia pyxidata var. *pocillum* Ach. Recorded by Willey (*l. c.*). This is an arctic variety not otherwise known from New England, and this record must, therefore, be considered doubtful.

Cladonia alpicola var. *Karelica* Wainio. This is stated by Wainio to be synonymous with the true *Cl. symphycarpa* of Fries. It is recorded from New England by G. K. Merrill in Bryologist **12**:46 (1909), but no specimens examined appear to belong here, and it is, therefore, omitted until better known. Mr. Merrill has also, within the last year, segregated two new species, *Cladonia multiformis* (in Bryol. **12**:1) and *Cl. polycarpia* (in Bryol. **12**:46). It has seemed best, however, not to include these in the list until their status can be determined by further study.

Wellesley College.

Scirpus Smithii in Massachusetts.— When the Preliminary List of New England Cyperaceae [1] was issued, *Scirpus Smithii* Gray was unknown from two of the New England States, New Hampshire and Massachusetts. Very quickly thereafter Mr. F. W. Batchelder [2] recorded it from the shore of Lake Massabesic in southern New Hampshire, and it is now gratifying to report it from eastern Massachusetts. On September 18 last, the writer, attracted by the report of an extensive station for *Sparganium lucidum* Fernald & Eames, *Cyperus aristatus* Rottb., *Hemicarpha micrantha* (Vahl) Pax, *Xanthium canadense* Mill., and other species which are among the most local of Middlesex County, joined Mr. A. J. Eames on a trip to Heard's Pond, Wayland. These plants were soon found in abundance, as well as several which were before unknown from that station. Among them is *Scirpus Smithii* which grew in a shaded mucky shore where it was hidden by the taller grasses and sedges. It is interesting that *S. Smithii* should be the only one of the *Scirpus debilis* group at Heard's Pond, for in eastern Massachusetts the members of this group show a remarkable tendency to restrict their development to very isolated stations. Thus *S. Hallii* is known in New England only from the shores of Winter Pond; *S. debilis*, var. *Williamsii* has as yet a single known station (in the world), the margin of Massapoag Lake in Sharon, where it abounds to the exclusion of other members of the group; and now *S. Smithii* is found at its first Massachusetts station, Heard's Pond, where no other members of the group are known. *S. debilis* (typical) is the only plant of the group as yet known from more than a single pond-shore, but even that species is so local as to be unknown to most of our New England botanists.— M. L. Fernald, Gray Herbarium.

[1] Rhodora, x. 135–144 (1908).
[2] Rhodora, x. 205 (1908).

Vol. 11, no. 130, including pages 181 to 200, was issued 3 November, 1909.

Gray's New Manual of Botany—7th Edition

An illustrated flora of the Northern United States and Canada east of the 96th meridian. By ASA GRAY, LL.D., late Professor of Natural History, Harvard University. Thoroughly revised and largely rewritten by BENJAMIN LINCOLN ROBINSON, Ph.D., Asa Gray Professor of Systematic Botany, and MERRITT LYNDON FERNALD, S.B., Assistant Professor of Botany, Harvard University, assisted by specialists in certain groups. With more than nine hundred text figures.

Regular Edition. Cloth, illustrated, 8vo 928 pages. Price, $2.50.

Tourist's Edition. Limp leather, 5×7½ inches. Price, $3.00.

AMERICAN botanists, who have been impatiently awaiting the revision of this indispensable work, will be delighted to know that a seventh, completely revised, and copiously illustrated edition, is now ready. The revision has entailed years of work by skilled specialists. No effort or expense has been spared to attain the highest degree of clearness, terseness, and accuracy. The plant families have been rearranged in a manner to show the latest view of their affinities, and hundreds of species have been added to the flora. The nomenclature has been brought into thorough accord with the important international rules recently established — a feature of great significance. Indeed, the Manual is the only work of its scope which in the matter of nomenclature is free from provincialism and rests upon a cosmopolitan basis of international agreement. Nearly a thousand figures have been added, and scores of brief and lucid keys have been introduced in a manner which greatly simplifies the problem of plant identification. The work has been extended to include Ontario, Quebec, and the maritime provinces of Canada.

AMERICAN BOOK COMPANY

New York Cincinnati Chicago Boston

HOME GROWN LILIES.

Fresh from Beds. Wild Flowers, Hardy plants of all kinds.
Send for catalogue.

F. H. HORSFORD, Charlotte, Vt.

BIRDS OF MAINE

is the latest and most complete work on northeastern bird life. It is an illustrated work of 693 pages and contains descriptions of the plumage and full accounts of the nests, eggs, habits and general home life of 327 species of birds. As a book for the amateur or for the scientific student of bird life in northeastern America it is unexcelled. Sent prepaid on receipt of price, $3.50. Address all orders to

ORA WILLIS KNIGHT, 84 Forest Avenue, Bangor, Maine.

CAMBRIDGE BOTANICAL SUPPLY COMPANY,

WAVERLEY, MASS.

BOTANICAL SUPPLIES OF EVERY DESCRIPTION.

Samples of Driers and Mounting Papers sent on request.
ASK FOR NEW CATALOG, NO. 91.

STANDARD MATERIAL. IMMEDIATE SHIPMENT.
Physiological Instruments. How do Plants Work?

Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB.

Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON Editor-in-chief.

FRANK SHIPLEY COLLINS
MERRITT LYNDON FERNALD } Associate Editors.
HOLLIS WEBSTER

WILLIAM PENN RICH } Publication Committee.
EDWARD LOTHROP RAND

Vol. 11. December, 1909. No. 132.

CONTENTS:

Submarine Bog at Woods Hole. *H. H. Bartlett* 221
Points in Nomenclature in Trientalis and Rubus. *W. H. Blanchard* 236
Excretion of Sodium Chloride by Spartina. *A. B. Klugh* . 237
Matricaria inodora, var. salina in Massachusetts. *W. Deane* 239
Errata 240
Index 241

Boston, Mass.
1052 Exchange Building.

Providence, R. I.
Preston and Rounds Co.

RHODORA.—A monthly journal of botany, devoted primarily to the flora of New England. Price $1.00 per year ($1.25 to all foreign countries including Canada); single copies 15 cents. Volume 1, $2.00, Vol. 2, $1.50. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to

B. L. ROBINSON, 3 Clement Circle, Cambridge, Mass.

Subscriptions, advertisements, and business communications to

W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

Single copies may be had from

E. L. RAND, Corresponding Sec'y N. E. Botanical Club,

1052 Exchange Building, Boston, Mass.

Entered at Boston, Mass., Post office as Second Class Mail Matter

---

SYNOPTICAL FLORA OF NORTH AMERICA, by A. Gray and others. Vol. I. Fascicles 1 and 2. A critical treatment of forty-five families of polypetalæ (*Ranunculaceæ to Polygalaceæ*) 1895-1897. $5.20.—Gray Herbarium of Harvard University, Cambridge, Mass.

KEY TO NEW ENGLAND TREES, Wild and Commonly Cultivated, based primarily upon leaf characters, by J. Franklin Collins and Howard W. Preston. Price 40c. net. Preston & Rounds Co., Providence, R. I.

WASHINGTON'S FLORA.

A few complete sets and some incomplete ones of my Fascicle XII of Washington Plants are still on hand; also specimens of many species distributed in earlier fascicles. Send for lists.

W. N. Suksdorf - - Bingen, Wash., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. Day. Leatherette. Pocket size. Invaluable for collectors' memoranda and herbarium records. Published and sold by the Gray Herbarium, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3-4 in. *1 year $4.00, 6 months $2.50.*

Shore line of submarine Chamaecyparis bog (Woods Hole, Mass.) at low tide.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 11. December, 1909. No. 132.

THE SUBMARINE CHAMAECYPARIS BOG AT WOODS HOLE, MASSACHUSETTS.[1]

HARLEY HARRIS BARTLETT.

(Plate 82.)

THE bog which is described in this paper is of unusual interest from two stand-points,— to the botanist because it illustrates the genesis of a typical salt-marsh from a fresh water bog, to the geologist because it affords evidence of post-glacial subsidence in the Cape Cod district. It is probable that the origin of salt-marshes through invasion of fresh water bogs by the sea has not been infrequent on the New England coast, but with the exception of a recent paper by Penhallow, very little has been written on the subject. The question of post-glacial subsidence, on the other hand, has been much discussed. It hardly comes within the scope of this paper more than to state that geologists have shown that such a subsidence has taken place from Nova Scotia to New Jersey, and that it is still in progress. Along certain parts of the coast, however, evidence of subsidence has either never been carefully studied, or has been considered inadquate. For example, Penhallow [2] quotes Mr. Fuller of the United States Geological Survey as follows: — "Of the instances [of submerged stumps and peat masses] mentioned by Shaler and others in Massachusetts, those at Nantucket and Truro are perhaps the most prominent. The submerged stumps at Truro have, in part at least, reached their present position by undermining. I have not examined the Nantucket locality. There appears, however, on the whole, to be very little evidence of a post-glacial subsidence in this region, although Dr. T. A. Jaggar a few

[1] Published by permission of the Director of the U. S. Geological Survey.

[2] Trans. Roy. Soc. Can. 3d. Ser. vol. i, section iv (1907), p. 22.

years ago concluded from observations on wharves at Boston, that there had been a sinking of two feet during the past century." In view of this statement, the presentation of new evidence concerning subsidence in the Cape Cod district seems to be justified.

Before discussing either the formation of salt-marshes or the question of subsidence, it will be necessary to describe in brief the topography of the region about Woods Hole, and, rather more in detail, certain features in the historical development of the Chamaecyparis bogs which are found there.

Woods Hole lies at the southern extremity of the basal lobe of Cape Cod, on the Falmouth continuation of the Plymouth moraine. The glacial drift is for the most part very coarse, and readily permeable to water. The water table is reached at slight depths. Northward from the village the surface is characterized by a number of kettle holes,— steep-walled depressions in the till supposed to have been formed by the melting of isolated masses of buried or imbedded ice after the recession of the ice sheet. These are occupied either by ponds or by Chamaecyparis bogs, and are, of course, undrained. Their vegetation was described several years ago by C. H. Shaw.[1] Although his paper gives a good idea of the present flora of the bogs, it is inaccurate in so far as it relates to their development.

The typical ice-block hole has steep sides, and, comparatively speaking, a flat bottom. The vegetation which occupies it belongs to one of four types, which are determined by the relation of the water table to the surface of the ground. 1) The water table is far enough below the ground surface so that the mesophytic vegetation of hillsides and valleys becomes established. This condition is uncommon about Woods Hole because the water table is very close to the surface. 2) The water table practically coincides with the floor of the depression, so that conditions favor a hydrophytic vegetation. In holes of this type Chamaecyparis bogs have developed. 3) The water table intersects the ground level on the gently sloping floor of the hole. In this case there is a shallow pond at the center, with an annular area around it, where, as in a hole of the last type, the water table is near the surface of the ground and conditions are favorable for *Chamaecyparis*. 4) The water table intersects the steep sides of the depression. Here there is no habitat favorable for *Chamaecyparis*.

[1] The Development of Vegetation in the Morainal Depressions of the Vicinity of Woods Hole. Bot. Gaz. xxxiii, (1902) p. 437.

Moreover, since the usual kettle-hole pond has no outlet, great seasonal fluctuation in water level prevents mat-forming plants from getting a foothold. The pond in a depression of this type remains open, and usually has a gravelly beach.

Mr. Shaw's studies led him to believe that the Woods Hole Chamaecyparis bogs had been formed by the growth of *Chamaecyparis* on floating mats after they had already become firm enough to be occupied by a thicket of various shrubs. In accord with this idea, he termed the shrubs which are found in the cedar bogs, *Leucothoë, Kalmia angustifolia*, etc., relicts from a former thicket vegetation. In his paper three individual bogs are described, designated as "x," "y" and "z." Bog "x" differs from bogs "y" and "z" chiefly in having a pool at the center, which Mr. Shaw considers to have been a remnant of open water at the center of the pond when *Chamaecyparis* took possession of the mat. Soundings show the incorrectness of this conclusion. As a matter of fact, bogs "y" and "z" seem to have developed in depressions of the second type defined in the preceding paragraph, and bog "x" probably in a depression of the third type. In all three bogs, the peat contains Chamaecyparis stumps and roots *in situ* from top to bottom. There is no trace of a mat. Throughout their history, the increase in thickness of peat in these bogs has been accompanied by a corresponding rise of the water table, the mechanism of which is easily explained.

Let us assume, for the sake of argument, the existence of a flat water table beneath an uneven ground surface. Supposing that the capacity for loss of water at the ground surface through evaporation and plant transpiration were uniform over the whole area, then the amount of water lifted by capillarity from the water table to the ground surface and there lost by evaporation would vary inversely as the distance between the two surfaces. The limiting condition which would be approached through the operation of this one factor would be parallelism of water table and ground surface. Rain, falling upon the surface, would be, over a small area, evenly distributed. By far the larger part would sink into a porous soil at once. Since its movement would then be controlled only by gravitation, it would be added to the water table in a layer of uniform thickness, and would not tend to modify the parallelism of the water table and the ground surface. Two factors would tend to have a flattening effect on the water table,— the filling of its depressions by run-off water and the operation of

hydrostatic pressure. The latter would bring about final equilibrium. High levels of the water table would sink, and low levels rise, until the pressure gradient from high to low levels balanced the resistance offered by the soil to the passage of water through it from points at the high level to points at the low level. This would be the condition of equilibrium.

Applying these considerations to kettle holes, we see: — 1) that the water level in such a hole marks the lowest level in the water table of its drainage area, 2) that by replacing the kettle hole by a high hill, the same area might be made to coincide with the area of greatest elevation of the water table, and 3) that between these two conditions of the water table, any intermediate condition might be established by gradually filling the depression with a porous medium, such as soil or peat. The growth of a peat deposit in a kettle hole would continue until the water table lagged too far behind the bog level to provide sufficient moisture for preservation of peat from atmospheric oxidation.

We may now turn to the bog which it is the special object of this paper to describe.

As one walks along the shore from Woods Hole to Quamquisset, a salt-marsh is encountered which forms a prolongation of a slight lobe of the harbor. Its greatest width is about four hundred and fifty feet; its length perhaps twelve hundred feet. Seven hundred feet inland there is a constriction where the width is only about forty feet. So far as the vegetation is concerned, the seaward portion is a typical salt-meadow. Otherwise, however, it presents two anomalous features, in that it is neither penetrated by a tidal creek nor protected from the sea by a barrier beach. The explanation of this unusual topography is disclosed at low tide, in a line of stumps and prone logs along the water's edge,— the stumps in the position in which the trees grew. These show that our salt marsh is a peat bog which the sea has invaded, not a tidal flat built up through the usual agencies of salt-marsh formation. The stumps lie in the face of an escarpment only a foot or so high, formed by undercutting of the peat in which they are imbedded. At the surface the peat is protected from erosion by three or four inches of tough Spartina turf. At high tide this turf is submerged; at low tide a few feet of beach slopes gradually from the escarpment to the water. On the beach the peat is covered by a few inches of pebbles and bowlders, thrown up by the waves. Plate 82 is from a photograph of the shore, taken at low tide.

Microscopical examination of wood from the stumps has shown that the trees were *Chamaecyparis thyoides.* Some of them, between three and four feet in diameter, were larger than any trees of this species now found in the vicinity of Woods Hole. The wood is still solid, and wonderfully preserved. When cut after the salt water has dried out, it is as fragrant as though fresh. Besides wood, the peat contains seeds of *Chamaecyparis* and countless little rod-like particles of resin which appear to have been derived from the glands on its scale-like leaves. Other identifiable remains are *Sphagnum,* seeds of an alder, and achenes of sedges. Throughout the entire marsh the character of the peat is the same. Wood is found at all depths. This fact, taken in conjunction with the general topography of the depression, leaves no doubt but that our marsh is a kettle hole Chamaecyparis bog drowned by the sea. This conclusion is borne out by a study of the zonation of vegetation in the marsh, for in the extreme landward part *Chamaecyparis* is still growing, and peat similar to that which underlies the salt-marsh is still forming. Soundings in this part of the bog show that its history as a Chamaecyparis bog has been unbroken. It has never been submerged below sea level, for there is no stratification of the peat which would indicate this. In recent times, however, there have been no trees in this part of the bog as large as those found at depths of three or four feet, which correspond in age to those exposed in the peat at the edge of the salt-marsh.

No doubt most botanists are familiar with Shaler's papers [1] in which the zonation of salt-marshes and the plant succession concomitant with their upward growth are described. *Zostera* and various sea weeds, growing densely on shallow bottoms, retard the velocity of tidal water so that it deposits among them part of the sediment which it carries in suspension. When by this means a tidal flat has been built up sufficiently, *Spartina glabra* establishes itself and collects sediment even more efficiently than the eel-grass. Finally, when the marsh has been built practically to high tide level, *Spartina glabra* is for the most part replaced by *Spartina patens* and *Juncus Gerardi.* A growing marsh shows these three zones, which are represented in a vertical section of a mature marsh by three corresponding strata.

[1] Sea-Coast Swamps of the Eastern United States. 6th Ann. Report U. S. Geol. Surv. (1884–85) p. 359.

Beaches and Tidal Marshes of the Atlantic Coast. National Geographic Monographs, i no. 4 (1895) p. 137.

The history of the Quamquisset marsh has been almost the reverse of this. The fresh water flora of a Chamaecyparis bog, which was cut into at one end by wave erosion, was killed back for a considerable distance from the sea. In consequence, the deposition of peat in this part of the bog was practically stopped, although it was not interrupted further inland. Ultimately a sloping surface was established. When, by subsidence of the whole area, the lowest part of this slope reached the high tide level, *Spartina patens* and *Juncus Gerardi* occupied it. After further subsidence, *Spartina glabra* replaced these two species, which moved farther up the slope. In this case it will be noticed that the order of the two zones from the sea landward is the same as in a typical salt-marsh, but that the vertical arrangement of the strata is just the reverse.

Under ordinary circumstances, the growth in thickness of *Spartina patens* turf is very rapid, and easily keeps pace with the lowering of a marsh surface by subsidence, but at Quamquisset Harbor very little silt is brought in by the inflowing tides and still less is derived from the surrounding slopes, so that the salt-marsh deposits consist of a densely matted mass of root stocks at most a few inches thick. In more typical salt-marshes the Spartina turf usually contains far more silt than organic matter, and is therefore less compact.

Between the two zones of markedly halophilous plants and the fresh bog vegetation above high tide level occur two zones the flora of which consists of facultative halophytes. Among them are halophytes which grow as well in a non-saline as in a saline situation (e. g. *Triglochin maritima, Ptilimnium capillaceum*, etc.) and, conversely, plants which are typical of our upland fields and woodland (e. g. *Aspidium Thelypteris, Rhus Toxicodendron*). Athough these plants are subjected to great extremes of salinity (their varying ability to withstand which probably accounts for their zonation), the analytical data presented below show that in at least the upper of the two zones, the salinity at the height of the growing season is very slight indeed. In this connection the conclusions of Kearny [1] and of Olsson-Seffer [2] in regard to the salinity of soil water on sea beaches have an important bearing. Briefly summarized, they are as follows: — 1) that the salinity of the soil water of the middle and upper beaches is in reality very slight, but, as in the transition zones of the salt marsh, subject to great fluctuations; 2)

[1] Are Plants of Sea Beaches and Dunes true Halophytes? Bot. Gaz. xxxvii (1904), p. 424.

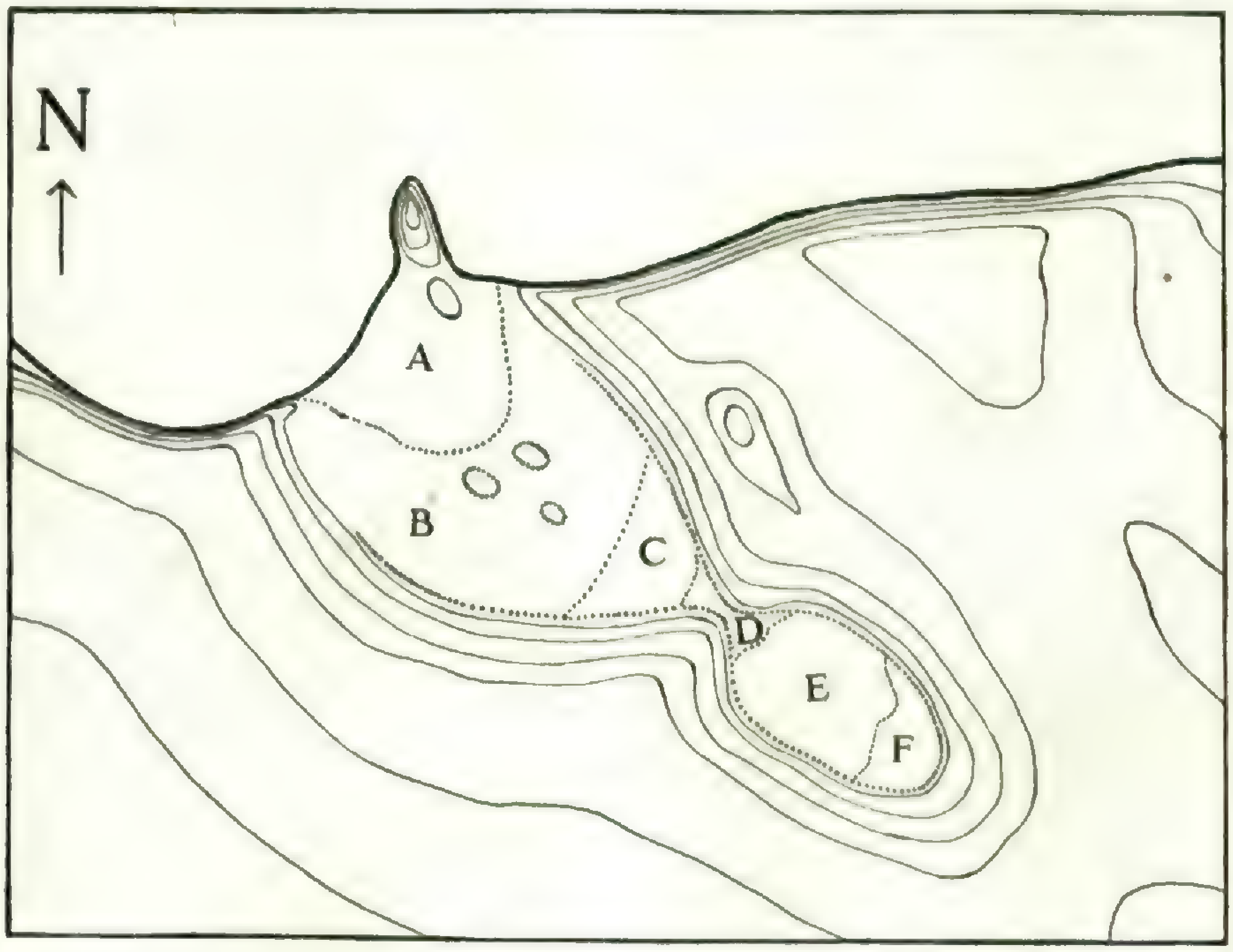
[2] Relation of Soil and Vegetation on Sandy Sea Shores. Bot. Gaz. xlvii (1909), p. 85.

that the plants of sea beaches are not generally halophytes, in the same sense that the plants of inland saline situations are, but are for the most part merely such plants of normally non-saline habitats as are able to withstand a high salt concentration without injury. These conclusions, considered in conjunction with the fact that a large proportion of the species of the beach and transition zone floras, although not necessarily always found within the limits of tide water, are, nevertheless, seldom found more than a few miles from the ocean, suggest that we may have to alter somewhat our conception of what constitutes a halophyte. The broad geographic ranges of the plants of these two transition zones (in part the same species as those which occur at the head of tide water in the region of the Bay of Fundy [1]) can not be correlated with their adaptability to growth in highly saline situations. If, however, we consider not absolute salinity but the ratio of saline constituents in the soil water, irrespective of absolute concentration, the possibility of correlating geographic range with physiological requirements becomes much greater. A moment's inspection of an analysis of an average soil water (in which the concentration of mineral salts is very slight), will show how comparatively small an admixture of sea water would suffice to bring the ratio of elements into approximate agreement with sea water. Further addition of sea water would increase absolute salinity, but would change ratios very slightly. May it not be a useful working hypothesis that sea water, in whatever dilution, is physiologically normal with regard to the plants of salt marshes and sea beaches, and that their usual local distribution is due altogether to the operation of factors other than chemical? The writer hopes to carry out some experimental work along the line of this suggestion. The constitution of soil water is influenced many miles inland by salt spray from the ocean. "The normal chlorine, or maximum proportion of chlorine (present as common salt or sodium chloride) which may exist in an uncontaminated water, usually varies inversely as the distance from the sea, the range for Massachusetts being from 2.42 parts per 100,000 at Provincetown....to 0.06 parts in Berkshire County. The normal chlorine not only depends upon proximity to the coast, but it is highest on the salient and most exposed parts of the coast, where the surf breaks heavily and the salt spray is wafted inland most freely." [2]

[1] Ganong. The Vegetation of the Bay of Fundy Salt and Dyked Marshes; an Ecological Study. Bot. Gaz. xxxvi (1903), pp. 161, 280, 349, and 429.

[2] W. O. Crosby. U. S. Geol. Surv. Water Supply and Irrigation paper No. 114 (1905) p. 73.

The non-halophilous vegetation of the fresh part of the bog may be somewhat arbitrarily divided into two zones at the point where *Chamaecyparis* drops out of the flora. The zonation here appears to be due to the increasing quantity of salt in the bog water as high tide level is approached. The flora of the landward zone is essentially of the same composition as in those Chamaecyparis bogs of the region which are not open to the direct influence of the sea. Since certain of its species are more sensitive to the action of salt than others, they drop out of the flora at varying distances seaward. That portion of the fresh part of the bog between the Chamaecyparis zone and the transition zone is composed of certain relicts from the flora of the Chamaecyparis bog, together with invaders from other fresh water habitats.



The sketch map shows the six zones, designated, in order from the sea landward, A, B, C, D, E, and F. Plants which belong properly to none of these zones occur in standing water of the marginal fosse,— a well marked topographical feature in the fresh part of the bog, which is by no means obliterated in the upper part of the salt marsh.

In the following lists it has been convenient to group the plants of some of the zones according to manner of growth, as, for example, those of zone F into trees, shrubs, herbs and mosses. Where this has

been done, the species of each group are arranged as nearly as possible in the order of their abundance and the groups are separated by lines.

A. Spartina glabra var. pilosa Merr.
Limonium carolinianum (Walt.) Britton.
Spergularia canadensis (Pers.) Don.
Salicornia mucronata Bigel.
Salicornia europaea L.
Salicornia ambigua Michx.

At the edge of the marsh where the waves have thrown up a little gravel occur also:

Spartina patens (Ait.) Muhl.
Distichlis spicata (L.) Greene.

B. Spartina patens (Ait.) Muhl.
Distichlis spicata (L.) Greene.
Juncus Gerardi Lois.
Limonium carolinianum (Walt.) Britton.
Triglochin maritima L.
Gerardia maritima Raf.

Low muddy spots within this zone, from which tide water drains more slowly than from the *Spartina patens* turf, contain part or all of the following flora. They should perhaps be associated with zone A.

Limonium carolinianum (Walt.) Britton.
Triglochin maritima L.
Plantago decipiens Barneoud.
Spergularia canadensis (Pers.) Don.
Gerardia maritima Raf.
Spartina glabra var. pilosa Merr.
Distichlis spicata (L.) Greene.
Scirpus campestris var. paludosus (A. Nels.) Fernald.

At the landward edges of this zone, the water becomes much less salt. Here the *Spartina patens* and *Juncus Gerardi* grow much taller, and are associated with *Agrostis alba* var. *maritima* (Lam.) G. F. W. Mey.

C Scirpus americanus Pers.
Triglochin maritima L.
Spartina patens (Ait.) Muhl.
Pluchea camphorata (L.) DC.
Ptilimnium capillaceum (Michx.) Raf.
Galium Claytoni Michx.

Cyperus Nuttallii Eddy.
Hypericum virginicum L.

Whitened wrack, left by the winter storms, is covered with *Atriplex patula* var. *hastata* (L.) Gray. In unusually wet places, and near the marginal ditch, occur the following species:

Eleocharis palustris (L.) R. & S.
Agrostis alba var. maritima (Lam.) G. F. W. Mey.
Cyperus Nuttallii Eddy.
Pluchea camphorata (L.) DC.
Juncus pelocarpus Mey.
Juncus acuminatus Michx.

Two mosses which grow in the landward part of this zone, but are really characteristic of the next zone, are:

Sphagnum (near Sphagnum dasyphyllum Warnst.).
Amblystegium riparium (L.) Br. & Sch.

D. Spartina Michauxiana Hitchc.
Scirpus americanus Pers.
Cyperus Nuttallii Eddy.
Rhus Toxicodendron L.
Ptilimnium capillaceum (Mx.) Raf.
Agrostis alba var. maritima (Lam.) G. F. W. Mey.
Hypericum virginicum L.
Polygonum hydropiperoides Michx.
Aspidium Thelypteris (L.) Sw.
Decodon verticillatus (L.) Ell.
Vaccinium macrocarpon Ait.
Polygala cruciata L.
Juncus canadensis J. Gay.
Pluchea camphorata (L.) DC.
Apios tuberosa Moench.

Sphagnum (near Sph. dasyphyllum Warnst.).
Amblystegium riparium (L.) Br. & Sch.
Sphagnum (near Sph. obesum (Wils.) Warnst.).

Along this zone, the marginal ditch contains:

Typha latifolia L.
Agrostis alba var. maritima G. F. W. Mey.
Eleocharis palustris (L.) R. & S.

E. Clethra alnifolia L.
Myrica carolinensis Mill.
Rhus Toxicodendron L.
Vaccinium macrocarpon Ait.
Gaylussacia baccata (Wang.) K. Koch.
Gaylussacia frondosa (L.) T. & G.
Ribes oxyacanthoides L.
Pyrus arbutifolia var. atropurpurea (Britton) Rob.

Osmunda cinnamomea L.
Aspidium Thelypteris (L.) Sw.
Rhynchospora alba (L.) Vahl.
Eriophorum virginicum L.
Drosera rotundifolia L.
Lysimachia terrestis (L.) B. S. P.
Epilobium palustre L.

Sphagnum imbricatum var. cristatum f. fuscescens Warnst.
Sphagnum acutifolium var. rubrum Brid.
Sphagnum amblyphyllum var. parvifolium f. tenue sf. capitatum Grav.
Cladonia rangiferina (L.) Web.
Cladonia alpestris (L.) Rabenh.

Along this zone the marginal ditch contains:
Sphagnum cymbifolium var. virescens Warnst.
Typha latifolia L.
Glyceria canadensis (Michx.) Trin.
Decodon verticillatus (L.) Ell.

F. Chamaecyparis thyoides (L.) B. S. P.
Acer rubrum L.
Betula alba var. cordifolia (Regel) Fernald.
Salix rostrata Richards.

Clethra alnifolia L.
Myrica carolinensis Mill.
Rhus Vernix L.
Hamamelis virginiana L.
Rhododendron viscosum (L.) Torr.
Ilex verticillata (L.) Gray.

Ilex laevigata (Pursh) Gray.
Ilex glabra (L.) Gray.
Pyrus arbutifolia var. atropurpurea (Britton) Rob.
Vaccinium corymbosum L.
Viburnum cassinoides L.
Rhus Toxicodendron L.
Kalmia angustifolia L.
Lyonia ligustrina (L.) DC.

Osmunda cinnamomea L.
Aspidium Thelypteris (L.) Sw.

Sphagnum medium var. purpurascens Warnst.
Sphagnum flavicomans (Card.) Warnst.
Sphagnum imbricatum var. cristatum f. fuscescens Warnst.

In the marginal fosse at the head of the bog grow:

Sphagnum imbricatum var. affine (R. & C.) Warnst.
Sphagnum pulchricomum v. pulcherrimum f. sphaerocephalum Warnst.
Onoclea sensibilis L.

The chief interest of the foregoing lists will lie in the fact that the chlorine content of the bog water was determined at the boundaries of the zones, and at the point of each zone where its characteristic flora was best developed. The few such data which have been published regarding littoral floras refer, for the most part, not to marshes or bogs but to the strand, where the conditions of plant growth are very different. The amount of sea water which would have to be mixed with pure water in order to bring the chlorine content of any given sample up to the value found by analysis was calculated on the basis of a chlorine content of 1.82% for sea water. The samples were collected along the longitudinal axis of the bog, from holes made by pushing a post into the peat to the desired depth. After the water in the holes had attained its level and had settled somewhat, a sample was taken from each with a pipette. Chlorine was determined by titration with tenth normal silver nitrate, using potassium chromate as an indicator. An obscure end point of the reaction due to the coffee color of the water was avoided by greatly diluting each sample and by making titrations by artificial light. It was not even necessary to filter the samples. In the following table of results, an asterisk

indicates that a zone is more or less regularly inundated by sea water at high tide. Appropriate values for sea water are not filled in, however, because the fresh water table underlies the whole marsh, and would, in fact, coincide with its surface if it were not for downward displacement by sea water left on the marsh after high tide. Even at the line of stumps along the water's edge, peat from below low tide level is appreciably less salty to the taste than that from higher up. It may be that the salt concentration in the water from which deep rooting species draw their supply is much less than in sea water.

	Cl. concentration			% sea water			ΔOsmotic pressure in mm.		
Zone	Sea-ward limit	Center	Inland limit	Sea-ward limit	Center	Inland limit	Sea-ward limit	Center	Inland limit
A	*	*	*	*	*	*	*	*	*
B	*	*	$\frac{n}{16}$	*	*	11.2	*	*	2110
C	$\frac{n}{16}$	$\frac{n}{363}$	$\frac{n}{375}$	11.2	0.51	0.48	2110	102	95
D	$\frac{n}{375}$	$\frac{n}{217}$	$\frac{n}{158}$	0.48	0.82	1.12	95	180	220
E	$\frac{n}{158}$	$\frac{n}{214}$	$\frac{n}{217}$	1.12	0.84	0.82	220	180	180
F	$\frac{n}{217}$	$\frac{n}{1000}$	$\frac{n}{1700}$	0.82	0.18	0.11	180	35	21

In explanation of this table little need be said. The first three columns give the amount of chlorine found on titration, the second three columns the corresponding admixture with sea water, assuming the normal chlorine of the ground water to be negligible, and the last three columns give the approximate increase in osmotic pressure which would correspond to such admixture. Perhaps the most remarkable fact shown is that in the transition zone, D, the salinity is less than in the next zone landward. Of course this would not be true all the year round. That such a condition may sometimes obtain is due to the fact that zone D marks the line of intersection of the fresh water table and the marsh surface. Along this line there is constant upward seepage of fresh water, which washes away salt spray which is blown upon the surface. In zone E, on the other hand, the water table is below the surface and all salt spray sinks in, to be removed only by downward displacement. There is furthermore constant evaporation of capillary water from the surface in zone E, which results in an accumulation of salts at the surface, during dry weather. It is obvious that from zone D landward the osmotic pressures are too slight to influence the distribution of the flora.

The evidence afforded by the Quamquisset bog in regard to coastal subsidence remains to be considered. A line of soundings along the longitudinal axis of the bog disclosed a brown Sphagnum peat containing so many stumps and prostrate logs of *Chamaecyparis* that it was only with difficulty that a spot could be found where the sampling apparatus[1] could be pushed down to the sandy bottom without encountering wood. At the narrowest part of the bog, the center of zone D, and from here all the way to the water's edge, where the stumps shown in Plate 82[2] have been exposed by erosion, there are large stumps and logs within a foot of the surface. In this part of the bog the soundings showed depths from eight to fourteen feet, but in most of the holes the peat sampler encountered not the bottom, but wood. A bottom of moderately fine sand, like that found in the upper part of the bog, was reached by a fourteen foot sounding made at the extreme seaward edge of the marsh, at a point outside the escarpment, where the surface is about two feet below extreme high tide level. This proves that there has been no undercutting of the peat by wave action. By wading into the water a short distance, at low tide, the peat bottom was found to be soft and yielding beneath the layer of gravel and boulders which the waves have thrown upon it. From zone D landward to the living Chamaecyparis trees the soundings varied from 7.5 to over 15 feet. Two or three feet of this depth is above high tide level. In this part of the bog, also, difficulty was found in reaching bottom on account of wood, which in several cases was encountered at a depth of 15 feet.

If we accept as the greatest depth of the bog the fourteen feet found at the very edge of the beach, and add to that depth two feet as the maximum height of the tide above the surface at the point where the sounding was made, we get sixteen feet as the depth to which peat extends below high tide level. It has already been pointed out that in Chamaecyparis bogs where the peat contains wood from bottom to top, the water table originally coincided with the floor of the depression. When peat commenced to form in the Quamquisset bog, the floor of the depression must have been at least at high tide level, i. e., sixteen feet higher than at present. We must admit, therefore, a subsidence

[1] The peat sampler used was that devised by Davis, described in Report Mich. Geol. Surv. for 1906, p. 317

[2] This photograph is reproduced through the kindness of Mr. A. H. Moore, who made a special trip to Woods Hole in order to take it.

of at least sixteen feet, (probably more), since the first peat was laid down. Only two other suppositions could possibly be made: 1) that the *Chamaecyparis* grew in sixteen feet of water (!), or 2) that the water table sloped *away* from high tide level and was sixteen feet below it at a distance surely less than half a mile from the sea. The latter proposition is almost as absurd as the former, since in the loose drift deposits of the Cape Cod district the water table reaches the surface at approximately high tide level, and its gradient is always toward the sea.

In Shaw's paper (l. c.) bog "x" is described as a Chamaecyparis forest on a floating mat, covering a pond, the center of which is still open water. That this is not correct has already been pointed out. The condition of this bog is not that of youth, but of old age. On account of the fact that it is not far above sea level, the surface of the water table, approaching sea level as a limiting state, has remained almost stationary, while the land has subsided. The growth of peat has not kept pace with the (relative) rise of the water, and the result is that the bog is being drowned. The pond at the center is increasing in diameter and water stands two or three feet deep among the trees during much of the year. This bog is as truly a record of the subsidence of the region as the Quamquisset bog.

From a study of the Quamquisset bog a very rough idea can be gained of the rate at which subsidence has taken place. If we accept Shaler's estimate of a tenth of an inch a year as the rate of peat deposition (under varying conditions it may be much more or much less than this), a period of approximately 2300 years would have been required for the growth of sixteen feet of peat below high tide level (zones A–D) and three feet above high tide level (zones D–F). If we assume that during this time the subsidence has been the logical minimum, sixteen feet (i. e., that the bottom of the bog when peat began to form was at high tide level,— an improbable supposition) we obtain as the rate of subsidence eight and a half inches per century. This estimate accords with that reached by Prof. C. A. Davis, who has made investigations at other points on the New England Coast. A brief statement of his views in regard to the botanical and geological history of the New England salt-marshes has already appeared,[1] but a more complete account may be expected in an early number of Rhodora.

Washington, D. C.

[1] Bull. U. S. Geol. Surv. 376 (1909) pp. 19–20.

SOME POINTS OF NOMENCLATURE IN TRIENTALIS AND RUBUS.

W. H. Blanchard.

Botanists seem to have overlooked the name *Trientalis borealis* given to the star-flower by Rafinesque in 1808 (Medical Repository of New York, p. 354). They still use the varietal name of Persoon made specific by Pursh in 1814, and the recent edition of Gray's manual designates it *Trientalis americana* (Pers.) Pursh so as to do justice to Persoon as well as to Pursh. Rafinesque did not describe it but referred as did Persoon and Pursh to Michaux's description. Michaux called it *T. europaea* L. and decided that it did not differ from the European plant sufficiently to be separated. He briefly gave the variation of the American plant from the European and this constituted his description. Persoon's description of his var. *americana* "fol. angusto-lanceolatis" is verbatim Michaux's, and Pursh simply added to Persoon's description "acuminatis obliquis."

In accordance with Article 49 of the Vienna Rules the name *Trientalis borealis* Raf. is the one which should be used for our American star-flower, since it was the earliest given to the plant in its now generally accepted specific rank.

The American red raspberry was first named as a variety of *Rubus idaeus* L. by Richardson in the Appendix to Franklin's Journey, 1st ed., 1823, p. 739. He called it var. *canadensis* and referred to Willdenow and Pursh, and in the second edition of Franklin's Journey, p. 747 he accepted Michaux's disposition of it as *R. strigosus* and wrote a full description of it making it certain just what plant he meant. This second edition was published in the same year as the first and differs from it only in the botanical appendix which is slightly changed and considerably enlarged, his description of *Rubus triflorus* and of several other new species appearing in it. Var. *canadensis* Rich. should therefore be substituted for the later var. *aculeatissimus* [C. A. Mey.] Regel & Tiling in the New Manual.

Rafinesque was again first in the field with a specific name for the running raspberry, *Rubus triflorus* Richardson (*R. americanus* (Pers.) Britton). In 1811, in the Medical Repository of New York, p. 333, he proposed *R. pubescens* as a name for the plant described by Michaux

as *R. saxatilis*, var. *canadensis*. *R. pubescens* Raf., being the earliest specific name for the plant in question, should, according to the above cited article of the Vienna Rules, stand as the valid designation of the species.

WESTMINSTER, VERMONT.

EXCRETION OF SODIUM CHLORIDE BY SPARTINA GLABRA ALTERNIFLORA.

A. B. KLUGH.

WHILE at the Atlantic Coast Marine Biological Station at St. Andrews, New Brunswick, this summer (1909), I noticed that the leaves of *Spartina glabra alterniflora* (Loisel.) Merr., growing in a brackish marsh, had an abundance of crystals upon them. Upon scraping off some of these crystals and tasting them I found that they had the characteristic taste of Sodium chloride, and examination with a lens showed that they were cubes.

Although it struck me that the salt had been excreted by the leaves, I thought that (as it was at the time low tide, and the tide there rises from twenty-three to twenty-eight feet) possibly the plants were submerged at high-tide, and that the salt was deposited upon the leaves while they were submerged. So I returned to the marsh at high tide and found that the state of the tide made practically no difference in the level of the water in the marsh. I examined all the other species in the marsh carefully but failed to find any crystals upon them.

I then took some of the leaves to the Laboratory, cleaned them thoroughly, and placed the cut end of one in fresh-water and of the other in sea water over night. In the morning both had a large number of crystals upon them, there being however more upon the one placed in sea water than upon the other. That they formed at all upon the leaf placed in fresh water showed that there must have been a remarkable concentration of salt in the tissues of the leaf. I noticed that the great majority of the crystals were in the grooves of the leaves, there being however some upon the carinae.

I removed the leaf from the sea-water, cleaned it carefully, watched

it closely through a lens and soon observed minute droplets of solution appearing at intervals along the grooves. I held a portion of the leaf, upon which were several droplets, tightly upon my finger and noticed that the heat of my finger caused a little water to evaporate and that a cubical crystal formed, which was nearly as large as the droplet had been. I repeated this operation some twenty times, and found out how it was that some of the crystals were upon the carinae, for when a large drop evaporated it did not form a single large crystal, but formed four small ones, two of which were deposited upon the top of each ridge which bordered upon the groove.

Next I brought three entire plants to the Laboratory, cleaned one thoroughly of all crystals, and placed their roots in sea water. The next three days were foggy and the droplets excreted by the specimen which I had cleaned off remained as such, while the crystals on the other two specimens deliquesced. But on the fourth day the weather was dry and crystals appeared abundantly on all three plants.

I again cleaned off a leaf of the plant from which I had previously removed the crystals, and placing it over my finger watched the droplets emerge and the crystals form.

I then tested some of the juice of the leaf with $AgNO_3$ and got a heavy white precipitate which was insoluble in HNO_3, thus showing an abundance of chlorides. The solution excreted by the leaf gave an even heavier precipitate. Further than this very rough analysis I was unable, on account of lack of reagents, to carry my chemical investigations.

Some portions of leaves I fixed in chromo-acetic solution, brought them to our Botanical Laboratory, imbedded in paraffin and made sections in three planes to see if water-pores were present. I found that they were not, but that stomata were abundant and had very large intercellular spaces beneath them. The stomata are situated mostly near the bottom of the grooves. The grooves are very deep and have numerous small epidermal projections upon their walls.

Botanical Department,
Queen's University, Kingston, Canada.

MATRICARIA INODORA, VAR. SALINA IN MASSACHUSETTS.

Walter Deane.

On October 4, 1909, in company with Mr. C. F. Batchelder, I made a botanical trip to the extensive stretch of made land in South Boston, familiarly known as the "South Boston Flats." This large area is bordered by railroad tracks and grain elevators and is bounded on one side by the harbor. It is therefore a famous spot for introduced plants and has been a favorite mecca for botanists. Among other interesting plants which we found was a Matricaria which has been growing there for a number of years and is extremely abundant. Mr. C. E. Perkins collected it as early as 1882. It has been known as *Matricaria inodora* L. by the various collectors.

I later submitted specimens of this plant to Prof. M. L. Fernald who noticed that it differed from typical *Matricaria inodora* and, on comparison, found it to be *M. inodora* L., var. *salina* (Wallr.) DC. This variety was first described by Wallroth in Schedulae Criticae de Plantis Florae Halensis selectis, in 1822, page 485, as "*Pyrethrum inodorum β. salinum* W. pinnis foliolorum linearibus confertissimis brevibus mucronatis subtus parce pilosis," etc. De Candolle in the Prodromus, VI, 1837, page 52, refers to the plant as a variety of *Matricaria inodora* L. with the following description, "caule rubente, foliorum lobis brevioribus crassiusculis confertis." The short, crowded, thick lobes of the leaves readily distinguish it from the typical *M. inodora* which has much longer, less crowded, and thinner lobes of the leaves. Measurements of the ultimate lobes of typical leaves of European specimens show the average length to be 9.4 mm. for *M. inodora* and 3.3 mm. for *M. inodora,* var. *salina.* The variety, like true *M. inodora,* is an annual and is now generally distinguished by European authors from *M. maritima* L., a perennial species with which *M. inodora,* var. *salina* was formerly confused.

Matricaria inodora L., var. *salina* (Wallr.) DC. inhabits the saline regions of Europe and is now reported apparently for the first time from America. It is interesting to note that plants occurring in the halophytic regions of Europe are adapting themselves to similar conditions in this country, as is illustrated by the plant under consideration and

also by *Bassia hirsuta* (L.) Aschers, growing abundantly on the South Boston Flats and recorded in Rhodora, xi. 120. 1909, by Mr. C. H. Knowlton.

Cambridge, Massachusetts.

ERRATA.

Page	11,	line 26;	before *sericea* insert *S.*
"	37,	" 15;	*for* 45 *read* 46.
"	41,	" 9;	" *E. articulata* read *E. articulatum.*
"	45,	" 19;	" **E.** SATÌVUM read **E.** SATÌVA.
"	46,	" 30;	" *Parnassia grandiflora* read *Parnassia grandifolia.*
"	50,	" 13;	" Linoìdes R. read Linoìdes Roth.
"	52,	" 6;	" GRACÍLIOR read GRACÍLIUS.
"	56,	" 21;	" 49 read 48.
"		" 22;	" 51 read 50.
"	57,	" 22;	" Benth *read* Bieb.
"	59,	" 26;	" A. depaup. *read* A. parviceps.
"	61,	" 14;	" tennesseensis READ *vimineus.*
"	64,	" 35;	" *Vol. 12* read *Vol. 11.*
"	97,	" 25;	" V. Oxycoccus read V. Oxycoccos.
"	101,	" 5;	" FRAGILE read FRAGILIS.
"	131,	" 7;	" *Sisyrhinchium* read *Sisyrinchium.*
"	136,	" 8;	" *vulgaris* read *rivularis.*
"	137,	" 35;	" *B* read *B.*
"	162,	" 38;	" G. E. Dinsmore *read* J. E. Dinsmore.
"	163,	" 13;	" *G. E. Dinsmore* read *J. E. Dinsmore.*
"	176,	" 39;	" *cinnamonea* read *cinnamomea.*
"	197,	" 10;	" *Ravenellii* read *Ravenelii.*

Vol. 11, no. 131, including pages 201 to 220, was issued 3 December, 1909.

INDEX TO VOLUME 11.

New scientific names are printed in full face type.

Abies, 168; balsamea, 201–203, A new Variety of, 201, var. **phanerolepis**, 203; Fraseri, 203.
Abietineae, 167, 169–172.
Acacia angustissima, var. hirta, 49.
Account of certain noteworthy Features in the Habitat of Rhodora, 173.
Acer rubrum, 231.
Aceraceae, 50.
Actaea alba, 94; rubra, 94, forma neglecta, 94.
Addition to the Flora of New Jersey, An interesting, 121.
Additional Notes on Plants of Chesterville, Maine, 30.
Adenarium, 112; marina, 113; maritimum, 112, 115; peploides, 112, 113.
Aegagropila, 18, 149, 150.
Aegagropiles marines, 149, 150.
Agathis, 170.
Agrimonia striata, 95.
Agropyron, 27, 38; pungens, 39, 131.
Agrostis, 27; alba, var. maritima, 88, 229, 230; borealis, 88, var. **macrantha**, 88; hiemalis, 88.
Albizzia, 49.
Alder, 176.
Alfalfa, 28.
Alga, Green, 196; Red, 17.
Algae, 61–63, 128, 132, 150, 151, 196.
Algal or boghead Coals, On the Nature of so called, 61.
Algological Prophecy fulfilled, 196.
Alopecurus geniculatus, 88.
Alsine peploides, 113, subsp. oblongifolia, 114.
Amanita caesarea, 124; muscaria, 129.
Amaranthus blitoides, 179; graecizans, 130; retroflexus, 130.
Amarantus, 44.
Amaryllidaceae, 75.
Amblystegium riparium, 230.
Ambrosia psilostachya, 30.
Amelanchier, 27, 131; canadensis, 94, var. Botryapium, 47, var. tomentula, 47; oblongifolia, var. micropetala, 131; oligocarpa, 94.
America, Representatives of Potentilla anserina in eastern, 1; The Variations of Arenaria peploides in, 109.
American Crataegi in the Species Plantarum of Linnaeus, 181.
Ames, O., Recent nomenclatorial Changes in the Genus Corallorrhiza, 102.
Ammadenia major, 114; peploides, 109, 113, var. major, 114.
Ammodenia. See Ammadenia.
Ammophila, 131; arenaria, 88, 127.
Amphicarpaea, 50.
Amphicarpon, 37.
Amphicarpum, 37.
Anacampseros tryphylla, 46.
Anagallis, 127.
Anaphalis margaritacea, var. occidentalis, 99.
Andraea petrophila, 117.
Andreaeales, 16.
Andrews, A. L., Bryophytes of the Mt. Greylock Region,— IV, 116.
Andromeda glaucophylla, 97, 159; polifolia, 159.
Anemone, 130; parviflora, 93.
Angelica atropurpurea, 96.
Annonaceae, 44.
Annual Field Meeting of the Vermont Botanical and Bird Clubs, 124.
Anonaceae, 44.
Another Mushroom Book, 121.
Anserina, 48; argentea, 48; concolor, 48; grandis, 48; litoralis, 48; pacifica, 48.
Antennaria, 130; plantaginifolia, 130.
Anthemis Cotula, 130.
Anthoceros punctatus, 195.
Anthocerotales, 16.
Apios tuberosa, 129, 230.
Apocynum medium, 83.
Apolozia, 16.
Apple, 32.
Aquilegia, 130.
Arabis Drummondi, 14.
Aralia hispida, 96; nudicaulis, 96.
Araucaria, 170.
Araucarian Wood, Paracedroxylon, a new Type of, 165.
Araucarineae, 166, 168–171.
Araucariopitys, 169, 170.
Araucarioxylon, 168, 170.
Arctium, 130, minus, 60.

Arctostaphylos alpina, 97; Uva-ursi, 97, 128.
Arenaria, 109, 112, 113, 184; diffusa, 114; groenlandica, 184; lateriflora, 93; littoralis, 113; maritima, 113; peploides, 109–114, in America, The Variations of, 109, var. diffusa, 110, 112, 114, var. major, 111, 112, 114, var. **maxima**, 113, var. **robusta**, 114; portulacea, 113; sitchensis, 114; stricta, 184, in New Hampshire, The Status of, 184.
Arethusa, 30, 76; bulbosa, 30, 76, 92.
Argentina, 1, 2; Anserina, 3–5, 8, var. concolor, 8, var. grandis, 9; argentea 3–5, 8; Babcockiana, 3, 6; Egedii, 3, 6, 9; litoralis, 3, 6, 9; occidentalis, 3, 6; pacifica, 3, 6, 7, 9; subarctica, 3 8, 9; vulgaris, 8.
Arnica unilaschcensis, 141.
Arnoseris minima, 61.
Aronia, 47.
Artemisia caudata, 130; ludoviciana, 30; procera, 60; Stelleriana, 130.
Asclepias amplexicaulis, 129; incarnata, var. pulchra, 129; syriaca, 130; tuberosa, 129.
Ascyrum, 52.
Asparagus officinalis, 131.
Asperula galioides, 57; glauca, 57.
Aspidium, 27, 86; acrostichoides, 36, var. incisum, 35, 36; Filix-mas, 86; fragrans, 13, 14; marginale, var. Davenportii, 36; Schweinitzii, 36; simulatum, 36; spinulosum, var. dilatatum, 36; Thelypteris, 226, 230–232.
Asplenium Filix-foemina, 86.
Aster, 31, 131; depauperatus, 57, 59, 240, var. parviceps, 58, 59, var. pusillus, 59; dumosus, 31, A pubescent Variety of, 31, var. **Dodgei**, 31, 58, 60, var. strictior, 31; ericoides, 59, var. depauperatus, 59, var. parviceps, 59, var. pusillus, 59; hirsuticaulis, 61; ianthinus, 61; multiflorus, 61; multiformis, 61; nemoralis, 58, 61, 86, 99; nobilis, 61; paniculatus, var. cinerascens, 31; parviceps, 57–59, 240, var. **pusillus**, 59; puniceus, var. oligocephalus, 99; radula, 99, var. strictus, 99; spectabilis, 57–59; surculosus, 58, 59, 131; umbellatus, 99; violaris, 61.
Astragalus tennesseensis, 61.
Atriplex patula, var. hastata, 121, 230.
Atropa physalodes, 56.
Baeomyces aeruginosus, 217; byssoides, 215; ericetorum, 215, 217; placophyllus, 215; roseus, 215.
Baldwinia, 60.
Balls of vegetable Matter from sandy Shores, 149.
Balm of Gilead, 127.
Balsam Fir, 201.
Baneberries, 27.
Barbarea, 134, 138, The North American Species of, 134; americana, 134–137, 140; arcuata, 134, 135, 138; Barbarea, 139, var. stricta, 140; bracteosa, 138; gracilis, 136, 137, 140; hirsuta, 139, lyrata, 138, 139; orthoceras, 137, 138, 140, 141, var. **dolichocarpa**, 140; parviflora, 135; planisiliqua, 138, 141; plantaginea, 139; praecox, 134–136, 140; stricta, 134–137, 139, 140; taurica, 138; verna, 134-136, 139, 179; vulgaris, 134–139, var. arcuata, 138, 141, var. brachycarpa, 136, 139, var. bracteata, subvar. hirsuta, 139, var. gracilis, 137, 140, var. **hirsuta**, 139, var. longisiliquosa, 136, 137, 139, subsp. rivularis, var. longisiliquosa, 139, var. stricta, 139, 140, subsp. vulgaris, var. longisiliquosa, 136, 240.
Barbula gracilis, 117; rigidula, 117.
Bartlett, H. H., The geographic Ranges of certain Junci Poiophylli, 155; Nolina in the south Atlantic States, 80; Note on Oxalis stricta, var. viridiflora, 118; Rupture of the Exoperidium in Calostoma Ravenelii, 197; The submarine Chamaecyparis Bog at Woods Hole, Massachusetts, 221.
Bartonia, 74; iodandra, 87, 97.
Bartram, E. B., An interesting Addition to the Flora of New Jersey, 121; A Teucrium new to Massachusetts, 148.
Bassia hirsuta, 120, 121, 239.
Basswood, 28.
Batchelder, F. W., Scirpus lineatus in New Hampshire, 200.
Beach Plum, 127, 132.
Bearberry, 128.
Beckmannia, 38.
Belle Isle Cress, 140.
Bellincinia, 16.
Berberis, 130.
Betula alba, 13, var. cordifolia, 231; microphylla, 93; nana, var. Michauxii, 93.

Biatoria globifera, 100.
Bidens connata, var. petiolata, 60.
Black Spruce, 175, 201.
Blackberry, 128, 130, 132.
Blanchard, W. H., Some Points of Nomenclature in Trientalis and Rubus, 236.
Bog at Woods Hole, Massachusetts, The submarine Chamaecyparis, 221.
Boghead Coals, On the Nature of so called Algal, or, 61.
Bogs, Cedar, 223; Chamaecyparis, 222, 223, 225, 226, 228.
Boletus, 129, alveolatus, 123; edulis, 123, var. clavipes, 123; Frostii, 123.
Boston District, Reports on the Flora of the,— IV, 75, V, 204.
Botanical Club, Annual Field Meeting of the Vermont, 124; Club, The winter Meeting of the Vermont, 27; Society, Meeting of the Josselyn, 179.
Botrychium ternatum, var. rutaefolium, 13.
Brachyoxylon, 169–171.
Brachyphyllum, 169, 171.
Brachythecium rutabulum, 117.
Brainerd, E., Another Hybrid between a white and a blue Violet, 115.
Brake, 128.
Brassica, 44; arvensis, 130; juncea, 130.
Brewster, W., Occurrence of the Skunk Cabbage in an unusual place, 63; Viola Brittoniana at Concord, Massachusetts, 107.
Bromus inermis, 83, 121; tectorum, 130.
Bryales, 16.
Bryophytes of Connecticut, 15; of the Mt. Greylock Region,— IV, 116.
Buckwheat, 28.
Buxbaumiaceae, 16.

Cabbage, Skunk, 63, 64.
Calamagrostis canadensis, 88, var. acuminata, 88; hyperborea, 88; Pickeringii, 88.
Callicarpa, 55.
Callirhoë **Bushii**, 51; Papaver, 51.
Calopogon, 76; pulchellus, 76, 92.
Caltha palustris, 94.
Calostoma, 197; Ravenelii, 197, 198, Rupture of the Exoperidium in, 197.
Calypogeia, 16; fissa, 194; integristipula, 194; Neesiana, 193, 194; tenuis, 195; Trichomanis, 194, var. Neesiana, 193.
Camelina microcarpa, 22.
Campe Barbarea, 139, 140; stricta, 139.
Canada Thistle, 130.
Cape Cod, Notes on the Flora of Lower, 125.
Caraway, 178.
Carex, 131; arctata, 91; aurea, 90; brunnescens, 90; castanea, 90; Crawfordii, var. vigens, 14; crinita, var. gynandra, 179, var. minor, 179; deflexa, 90; exilis, 90; flacca, 40; glauca, 40; gracillima, 90, var. humilis, 90; hormathodes, var. invisa, 90, var. Richii, 83; lenticularis, 90; leporina, 90; leptalea, 90; limosa, 90; Michauxiana, 91, 179; muricata, 179; norvegica, 164; pauciflora, 90; paupercula, 90, var. irrigua, 90; polygama, 90; rariflora, 90; retrorsa, var. Robinsonii, 13; rigida, 90, var. Bigelovii, 90; salina, var. cuspidata, 90, 179; saxatilis, var. miliaris, 91, var. rhomalea, 91; scirpoidea, 90; seorsa, 83; squarrosa, 40; stellulata, 200; stipitata, 200; trisperma, 90, var. Billingsii, 83; typhina, 40; typhinoides, 40; vaginata, 90.
Carrot, Wild, 128.
Carum Carvi, 178. A color Form of, 178, var. atrorubens, 178, forma **rhodochranthum**, 178.
Cassandra, 174.
Cassiope hypnoides, 97.
Castalia odorata, 129.
Castilleia, 56.
Castilleja pallida, var. septentrionalis, 98.
Catnip, 127.
Cedar Bogs, 223; White, 175.
Cedroxylon, 168, 169, 171; transiens, 169.
Cedrus, 168.
Celastraceae, 50.
Centaurea nigra, 99, var. radiata, 99.
Cephalozia, 16; bicuspidata, 117; divaricata, 193; elachista, 191; erosa, 192; pleniceps, 195.
Cephaloziella, 185, 192; bifida, 192; byssacea, 192; divaricata, 192, 193; elachista, 191, 193; erosa, 192; Hampeana, 192, 193; myriantha, 195; trivialis, 192, 193.
Certain railroad Weeds of northern New Hampshire, 30.
Cetraria nivalis, 100.
Chaerophyllum procumbens, 52, 53; Tainturieri, 52, 53; texanum, 52, 53.
Chaetomorpha, 196, 197; Chelonum,

196; herbipolensis, 196; Melagonium, 25.
Chain Fern, 28.
Chamaecyparis, 222, 223, 225, 228, 234, 235; Bogs, 222, 223, 225, 226, 228, at Woods Hole, Massachusetts, The submarine, 221; thyoides, 225, 231.
Chamaedaphne calyculata, 97.
Chamaenirium, 144.
Chamberlain, E. B., Meeting of the Josselyn Botanical Society, 179.
Characium, 65, **cylindricum**, 66, 69, 70, 72–74; ensiforme, 66, 67; **gracilipes**, 65–67, 69, 70, 73, 74; Two new Species of, 65.
Chelone glabra, 98.
Chenopodiaceae, 120.
Chenopodium album, 121; glaucum, 30; leptophyllum, 179.
Chesterville, Maine, Additional Notes on the Plants of, 30.
Chiloscyphus pallescens, 195.
Chiogenes hispidula, 97.
Chorda, 151.
Chordaria, 151.
Chrysopsis falcata, 128.
Cincinnulus Trichomanis, var. Neesiana, 193.
Cirsium arvense, 130; discolor, 130; lanceolatum, 130; muticum, 99, var. subpinnatifidum, 99; pumilum, 130.
Cissus incisa, 51.
Cistaceae, 131, 132.
Cladonia, 128, 212, 217; alcicornis, 217; alpestris, 213, 215, 217, 231; alpicola, var. Karelica, 218, 219; amaurocrea, 214, 215; bacillaris, 212, 215, 217; bellidiflora, 213, 218, 219; Boryi, 218; caespiticia, 213, 215; cariosa, 213, 215, var. corticata, 213, 215, 217, 218; carneola, 215; cenotea, 214, 215, var. furcellata, 218; coccifera, 212, 215, 217, var. ochrocarpia, 215, var. pleurota, 215; cornucopioides, 217; cornuta, 213, 215; crispata, 214, 215, 217; cristatella, 212, 215, 219, var. ochrocarpia, 215, 219, var. paludicola, 212, 215, var. ramosa, 212, 215, var. vestita, 212, 215; decorticata, 213, 215; deformis, 100, 213, 215; degenerans, 214, 215; delicata, 213, 215; didyma, 212, 219; digitata, 212, 215; fimbriata, 214, 215, 217, var. adspersa, 218, var. coniocrea, 213, 215, 217, var. nemoxyne, 215, var. radiata, 214, 215, 217, var. simplex, 217, var. subulata, 213, 215, var. tubaeformis, 217; flabelliformis, 219; foliacea, var. alcicornis, 214, 216, 217; furcata, 213, 216–218, var. crispata, 217, var. palamaea, 213, 216, 218, var. pinnata, 213, 216, 218, var. pungens, 218, var. racemosa, 218, var. scabriuscula, 213, 216, 218, var. subulata, 218; glauca, 213, 216, 218; gracilis, 214, 216–218, var. chordalis, 100, 213, 216, 218, var. dilacerata, 216, 218, var. dilatata, 214, 218, var. elongata, 213, 216, 218, forma chordalis, 218, forma macroceras, 218, var. hybrida, 218, var. verticillata, 218, forma symphycarpia, 218; lepidota, 219; leptophylla, 219; macilenta, 212, 216, 217, 219; mitrula, 213, 216, 219; multiformis, 219; occurring in New England, Key to the Species and principal Varieties of, 212; papillaria, 212, 216; pityrea, 213, 214, 216, 218; polycarpia, 219; pulchella, 219; pyxidata, 214, 216, var. chlorophaea, 216, var. pocillum, 219; rangiferina, 213, 216, 231, var. alpestris, 217, var. sylvatica, 218; rangiformis, 213, 216, 218; reticulata, 214, 216, 218; squamosa, 214, 216, 218, var. multibrachiata, 216, 218, var. muricella, 214, 216, 218, var. phyllocoma, 216, 218; subcariosa, 213, 216, 218; sylvatica, 213, 216, 218; symphycarpa, 217, 218, 219; turgida, 100, 214, 216; uncialis, 213, 216; verticillata, 214, 216, 218.
Cladoniaceae, Preliminary Lists of New England Plants,— XXIII, 215.
Cladophora, 18, 19; cartilaginea, 19; **constricta**, 19, 20; gracilis, 20; **graminea**, 19, 20; **Howei**, 18, 20; **microcladioides**, 17, 20; New Species of, 17; pellucida, 19; rupestris, 20.
Cladorhiza, 103; maculata, 103.
Cleome, 45.
Clethra, 53; alnifolia, 231.
Clintonia borealis, 91.
Closterium rostratum, 67.
Clover, Hop, 199.
Club, The annual Field Meeting of the Vermont Botanical and Bird, 124; The winter Meeting of the Vermont Botanical, 27.
Coals, On the Nature of so called algal or boghead, 61.
Cochlearia officinalis, 94.
Collema plicatile, 101, 102; pulposum, 102.
Collins, F. S., An algological Prophecy

fulfilled, 196; New Species of Cladophora, 17; Notes on the Flora of lower Cape Cod, 125; Notes on Monostroma, 23.
Collins, J. F., The Bryophytes of Connecticut (Review), 15; The Weight of ice-covered Twigs, 32.
Cololejeunea Biddlecomiae, 195.
Color Form of Carum Carvi, 178; Form of Potentilla pumila, 152.
Comandra livida, 93, 164.
Concord, Massachusetts, Viola Brittoniana at, 107.
Conferva cartilaginea, 19.
Conifers, 170.
Conioselinum chinense, 96.
Connecticut, The Bryophytes of, 15.
Conringia, 45.
Coptis trifolia, 94.
Corallorrhiza, 76, 104, 106; Corallorrhiza, 106; innata, 106; maculata, 76, 102–106; multiflora, 102–106; odontorhiza, 76, 104; Recent nomenclatorial Changes in the Genus, 102; striata, 104; trifida, 77, 104, 106; Wisteriana, 102–106.
Coralorhiza, 103; maculata, 103.
Cordiates, 170.
Corema Conradii, 128.
Coreopsis rosea, 129.
Cornaceae, 130, 132.
Cornus canadensis, 175, 176; stolonifera, 96.
Coronopus didymus, 83, 179.
Cortinarius violaceus, 124.
Corylus americana, 107, Recognition of, 107; rostrata, 107, Recognition of, 107.
Couringia, 45.
Cranberry, 129; Mountain, 177.
Crateagi in the Species Plantarum of Linnaeus, American, 181.
Crataegus, 130, 181; arborescens, 181; coccinea, 182, 183, var. rotundifolia, 183; cordata, 183; Crus-galli, 181, 182; modesta, 183; monogyna, 47; Oxyacantha, 47; rotundifolia, 183, var. **pubera**, 183; tomentosa, 182; viridis, 181.
Cress, Belle Isle, 140; Early winter, 140.
Cristatella, 45, 46; Jamesii, 46.
Crowfoot, 130.
Cryptogramma Stelleri, 64, in New Hampshire, 64.
Cryptogramme, 35.
Cupressineae, 168.
Cupressinoxylon, 168, 169.
Cupressoxylon, 168.
Cuscuta, 54; compacta, 83.
Cushman, J. A., Reports on the Flora of the Boston District,— IV, 75, V, 204; Some interesting Maine Plants, 12.
Cymbidium, 103; corallorhizon, 103; odontorhizon, 103.
Cynosurus cristatus, 89.
Cyperaceae, 84.
Cyperus, 29, 131; aristatus, 39, 220; esculentus, 121; filiculmis, 83; Nuttallii, 230.
Cypripedium, 77; acaule, 77, 92; arietinum, 7; hirsutum, 77; parviflorum, 77, var. pubescens, 77.
Cystopteris fragilis, 86.

Dactylococcus De Baryanus, 72, 73; Hookeri, 72.
Danthonia spicata, 89.
Dasystoma pectinata, 56.
Daucus Carota, 128, forma rosea, 178; pusillus, 53.
Deane, W., Matricaria inodora, var. salina in Massachusetts, 239; Notes from Shelburne, New Hampshire, 21; Reports on the Flora of the Boston District,— IV, 75, V, 204.
Decodon verticillatus, 230, 231.
Dendroidaceae, 16.
Dermatophyton, 196; radians, 196.
Deschampsia flexuosa, 88.
Desmarestia, 151.
Desmodium, 130.
Dianthera, 56.
Dianthus plumarius, 131.
Diapedium, 57.
Diapensia lapponica, 97.
Dicliptera, 56; brachiata, 57.
Dictyosiphon, 151.
Didymodon rigidulus, 117.
Diervilla, 176; Lonicera, 175.
Diplophylleia taxifolia, 118.
Diplotaxis, 44, 45.
Distichlis, 38; spicata, 229.
Dolicholus, 50.
Draba arabisans, 14.
Drosera linearis, 14; longifolia, 94; rotundifolia, 200, 231.
Dysodia, 60.

Eames, E. H., Notes upon the Flora of Newfoundland, 85.
Early winter Cress, 140.
Eaton, L. O., Additional Notes on the Plants of Chesterville, Maine, 30.
Ectocarpus, 151.
Elatinoides, 56.

Eleocharis, 29; Engelmanni, 83; intermedia, 84; interstincta, 29, 83, Tubers on the Roots of, 29; palustris, 230, var. major, 39, var. vigens, 39; pygmaea, 84; quadrangulata, 29, 83, Tubers on the Roots of, 29; tenuis, 200.
Elm, 32.
Elodium, 16.
Elymus arenarius, 164.
Emendations of the seventh Edition of Gray's Manual,— I, 33.
Empetrum nigrum, 164, var. andinum, 95.
English Hawthorn, 47.
Enteromorpha, 23; Grevillei, 23; Linza, 24.
Epigaea repens, 97.
Epilobium, 143; adenocaulon, 96, 129; alpinum, 141–147, Status of, 141, var. fontanum, 146, 147, var. Hornemanni, 145, forma **lactiflorum**, 147, var. majus, 146, 147, var. nutans, 146, 147; alsinaefolium, 144, 146; anagallidifolium, 144–146; angustifolium, 129; coloratum, 129; Hornemanni, 96, 141–143, 145–147, Status of, 141; khasianum, 142; lactiflorum 141–144, 146, 147; nutans, 146, 147; origanifolium, var. intermedium, 146, 147; palustre, 96, 231, var. monticola, 96; paniculatum, 52.
Epipactis, 77; pubescens, 77; repens, var. ophioides, 92; tesselata, 77.
Equisetum fluviatile, forma limosum, 87; sylvaticum, 87.
Erigeron hyssopifolius, 99; salsuginosus, var. unalaschcensis, 141.
Eriocaulaceae, 40.
Eriocaulon articulatum, 40, 41, 240; decangulare, 41; septangulare, 40, 41, 91, 129.
Eriophorum angustifolium, 89, var. majus, 90; callitrix, 89, var. erubescens, 89; opacum, 13, 164; tenellum, 89; virginicum, 90, 231.
Errata, 240.
Eruca, 44, 45; sativa, 28, 45, 240.
Erysimum, 139; Barbarea, 138, 139; cheiranthoides, 22; lyratum, 138, 139; praecox, 140; vernum, 140.
Euonymus, 50.
Eupatorium hyssopifolium, 129; perfoliatum, 129; purpureum, var. maculatum, 98.
Euphorbia Cyparissias, 131; exigua, 50; Helioscopia, 30; hirsuta, 30.
Euphrasia americana, 13; Randii, 13, 98, var. Farlowii, 98.
Evans, A. W., Notes on New England Hepaticae,— VII, 185.
Evening Primrose, 199.
Excretion of Sodium chloride by Spartina glabra alterniflora, 237.

Federation of Natural History Societies, New England, 148.
Fern, Chain, 28.
Fernald, M. L., Emendations of the seventh Edition of Gray's Manual, — I, 33; Fimbristylis Frankii, var. brachyactis, n. var., 180; An inland Variety of Proserpinaca palustris, 120; Juncus articulatus, var. nigritellus in Maine, 164; A new Variety of Abies balsamea, 201; The North American Species of Barbarea, 134; Note on the Report of Scirpus nanus from Vermont, 84; A pubescent Variety of Aster dumosus, 31; The Representatives of Potentilla Anserina in eastern America, 1; Salix pedicellaris and its Variations, 157; Scirpus Smithii in Massachusetts, 220; The Status of Arenaria stricta in New Hampshire, 184; The Variations of Arenaria peploides in America, 109.
Ferns, 27, 28, 128, 132, 176.
Festuca rubra, var. prolifera, 89, var. subvillosa, 89, forma **vivipara**, 89.
Filipendula Ulmaria, 94, var. denudata, 48.
Fimbristylis, 39; Frankii, 180, var. **brachyactis**, 180; Vahlii, 180.
Fir, 175, 201, 202; Balsam, 201.
Fissidens minutulus, 117.
Flora of lower Cape Cod, Notes on the, 125; of Newfoundland, Notes upon the, 85; of New Jersey, An interesting addition to the, 121; of the Boston District, Reports on the,— IV, 75, V, 204.
Flynn, N. F., Plants new to Vermont, 198; The winter Meeting of the Vermont Botanical Club, 27.
Forbes, F. F., A new hybrid Violet, 14; Salix subsericea a distinct Species, 9.
Fumariaceae, 44.
Fungus, 28.
Fungi, 129, 132.

Galax, 54.
Galeopsis Tetrahit, 98.

Galinsoga parviflora, 84.
Galium asprellum, 98; Claytoni, 229; glaucum, 57; kamtschaticum, 13, 98; labradoricum, 98; triflorum, 98.
Ganong, W. F., On Balls of vegetable Matter from sandy Shores, 149.
Gaspé Peninsula, Notes on some Lichens from the, 100.
Gaylussacia baccata, 97, 231; dumosa, 97; frondosa, 231.
Gentiana Amarella, var. acuta, 7, 97; procera, 54.
Geocalyx, 16.
Georgiaceae, 16.
Geographic Ranges of certain Junci Poiophylli, 155.
Geranium, 130.
Gerardia maritima, 229; paupercula, 130; pedicularia, var. pectinata, 56.
Geum rivale, 94; strictum, 7.
Glaux maritima, var. obtusifolia, 7.
Gleditschia, 49.
Glyceria borealis, 89; canadensis, 231; grandis, 89; pallida, var. Fernaldii, 83.
Gnaphalium sylvaticum, 30, 99.
Gomphrena, 44.
Grass, Scurvy, 140.
Grasses, 27, 132, 177.
Gratiola aurea, 129, 152, forma helveola, 152.
Gray's Manual, Emendations of the seventh Edition of,— I, 33.
Green Alga, 196.
Gypsophila muralis, 199.

Habenaria, 77; Andrewsii, 31; blephariglottis, 77, 92, var holopetala, 92; bracteata, 7, 30; ciliaris, 78; clavellata, 78, 92; dilatata, 92, 179, 180, An omitted Record, 179; fimbriata, 78; flava, 78; Hookeri, 78; hyperborea, 92; lacera, 78; obtusata, 92; orbiculata, 78, 92; psycodes, 78, 92.
Hairy-fruited Variations of Rhus Toxicodendron, 162.
Halenia deflexa, 14, var. Brentoniana, 97.
Halianthus peploides, 113, var. diffusa, 114, var. oblongifolia, 114.
Hamamelis virginiana, 231.
Hard, M. E., [Notice of Work], 121.
Harpanthus scutatus, 118.
Harrison, A. K., Reports on the Flora of the Boston District,— IV, 75, V, 204.
Hawthorn, English, 47.
Hedysarum boreale, 14.
Heleineae, 57.
Helenieae, 57.
Heleocharis palustris, var. major, 39.
Heleochloa, 37.
Heleochloë, 37.
Helianthemum canadense, 131; majus, 131.
Heliotropium, 54.
Hemicarpha micrantha, 40, 220.
Hepaticae, 117; Notes on New England,— VII, 185.
Hibiscus Moscheutos, 131.
Hieracium, 130; Gronovii, 130; marianum, 84, 130; triste, 141; venosum, 130.
Hills of Snow, 46.
Holcus lanatus, 88.
Holosteum, 112; succulentum, 112, 114, 115.
Homalia Jamesii, 117.
Honckenya, 113; oblongifolia, 111, 114; peploides, var. diffusa, 114.
Honkeneja peploides, var. latifolia, 113, var. oblongifolia, 114.
Honkenya peploides, 113, 115.
Hop Clover, 199.
Hudsonia, 128; ericoides, 128, 131; tomentosa, 128, 131.
Hybrid between a white and a blue Violet, Another, 115.
Hydrangea arborescens, var. sterilis, 46.
Hydrocotyle umbellata, 129.
Hygropharis pratensis, 124.
Hyoscyamus niger, 179.
Hyoseris minima, 61.
Hypericum boreale, 96; virginicum, 96, 230.
Hypnaceae, 16.
Hypnum montanum, 117; stellatum, 117.
Hypoxys, 75; hirsuta, 75.

Ice-covered Twigs, The Weight of, 32.
Ilex glabra, 232; laevigata, 232; verticillata, 231.
Indian Pipe, 153.
Inland Variety of Proserpinaca palustris, 120.
Interesting Addition to the Flora of New Jersey, 121.
Ipomoea, 54.
Iridaceae, 75, 131.
Iris, 75; prismatica, 75; pseudacorus, 75; setosa, var. canadensis, 164, forma **zonalis**, 91; versicolor, 75, 131, 176.
Isoëtes, 87; echinospora, var. Braunii, 87.

Jeffrey, E. C., On the Nature of so called algal or boghead Coals, 61.
Josselyn Botanical Society, Meeting of the, 179.
Juncaginaceae, 208.
Junci, 164; Poiophylli, The geographic Ranges of certain, 155.
Juncus, 131; acuminatus, 230; alpinus, 164; articulatus, 91, 164, var. nigritellus, 164, in Maine, 164; bufonius, var. halophilus, 91; brachyphyllus, 155, 156; canadensis, 230; communis, var. montana, 87; compressus, 41; Dudleyi, 155; filiformis, 200; Gerardi, 41, 225, 226, 229; interior, 155; lampocarpus, 164, var. nigritellus, 164; longistylis, 41, 42, 91; new to New England, 31; nigritellus, 164; pelocarpus, 91, 230; stygius, var. americanus, 86, 91; subtilis, 42; tenuis, 155, 156, var. Williamsii, 14; trifidus, 31, var. monanthos, 31; Vaseyi, 155.
Jungermannia, 16; calycina, 189; divaricata, 193; elachista, 191, 192; endiviaefolia, 190; furcata, 185; glaucocephala, 194; Hampeana, 192.
Jungermanniales, 16.
Juniper, 22.
Juniperus communis, var. depressa, 22; horizontalis, 87.

Kallstroemia, 50.
Kalmia, 199, 200; angustifolia, 97, 175, 223, 232; latifolia, A remarkable Form of, 199; polifolia, 97.
Kantia, 16; Neesiana, 194; Trichomanis, var. Neesiana, 193.
Key to the Species and principal Varieties of Cladonia occurring in New England, 212.
Kickxia, 56.
Klugh, A. B., Excretion of Sodium chloride by Spartina glabra alterniflora, 237.
Knowlton, C. H., Reports on the Flora of the Boston District,— IV, 75, V, 204; Two introduced Plants, 120.
Krummholz, 163.

Labiatae, 132.
Lactuca Morssii, 131.
Lady's Slipper, Showy, 28.
Lambert, F. D., Two new Species of Characium, 65.
Lamium hybridum, 55.
Larix, 37; Johnseni, 169.
Lathyrus, 49; maritimus, 95, var. **glaber**, 95; myrtifolius, var. macranthus, 108; palustris, var. pilosus, 95, 108.
Lechea Leggettii, 83; maritima, 131.
Lecidea coeruleonigricans, 100; vesicularis, 100.
Leguminosae, 132.
Lejeunea cavifolia, 118.
Leontodon autumnalis, 99, var. pratensis, 99.
Leonurus Cardiaca, 127.
Lepidozia, sylvatica, 195.
Leskea nervosa, 117.
Leucothoë, 223.
Lichens, 100, 128, 132; from the Gaspé Peninsula, Notes on some, 100.
Lilac, 32, 127.
Liliaceae, 131.
Lilium philadelphicum, 131.
Limonium, 54; carolinianum, 229.
Linaria, 56; vulgaris, 130.
Linum striatum, 83.
Liparis, 78; liliifolia, 78; Loeselii, 78, 200.
Listera, 78; convallarioides, 92; cordata, 78, 92.
Lists of New England Plants, Preliminary,— XXIII. Cladoniaceae, 215.
Lobelia Dortmanna, 98, 129.
Locust, 128.
Loiseleuria procumbens, 97.
Lonicera, 211; caerulea, 209–211, Note on the Morphology of the Fruit of, 209, var. angustifolia, 210, var. villosa, 98; conjugialis, 211; emphyllocalyx, 210; Ferdinandi, 210; Griffithii, 211; involucrata, 211; oblongifolia, 211; vesicaria, 210.
Lonicera, § Chlamydocarpi, 210; § Vesicariae, 210.
Lonicera, subgen. Chamaecerasus, 211; subgen. Perichymenum, 211.
Lophozia confertifolia, 195; longiflora, 195; marchica, 118.
Ludwigia, 52.
Lupine, 128.
Luzula campestris, var. frigida, 91.
Lychnis Coronaria, 44.
Lycopersicon, 56.
Lycopersicum, 56.
Lycopodium annotinum, var. pungens, 13, 87; inundatum, 200; obscurum, var. dendroideum, 87; Selago, var. appressum, 87; sitchense, 87.
Lycopus uniflorus, 98.
Lyonia ligustrina, 232.
Lysimachia terrestris, 231.

Lythrum Salicaria, var. gracilius, 52, 240.

Maianthemum canadense, 91.
Maine, Additional Notes on the Plants of Chesterville, 30; Juncus articulatus, var. nigritellus in, 164; Plants, Some interesting, 12.
Malva moschata, 96; rotundifolia, 127.
Manual, Emendations of the seventh Edition of Gray's,— I, 33.
Marasmius, 123; cohaerens, 123.
Marchantiales, 16.
Marrubium vulgare, 127.
Massachusetts, Lathyrus palustris, var. pilosus (Cham.) Ledeb. in, 108; Matricaria inodora, var. salina in, 239; Scirpus Smithii in, 220; Some rare Plants from the Vicinity of Wellesley, 82; The submarine Chamaecyparis Bog at Woods Hole, 221; A Teucrium new to, 148; Viola Brittoniana at Concord, 107.
Matricaria, 239; inodora, 239, var. salina, 239, in Massachusetts, 239; maritima, 239.
Meadow Rue, 199.
Meeting of the Josselyn Botanical Society, 179; of the Vermont Botanical Club, The winter, 27.
Melampyrum lineare, 97, 98.
Melilotus, 49.
Mentha arvensis, var. glabrata, 14.
Menyanthes trifoliata, 98.
Merckia peploides, 113.
Metzgeria, 188; conjugata, 186–189; **crassipilis**, 188, 189; dichotoma, 189; furcata, 185–189, subsp. M. crassipilis, 188; glabra, 185; hamata, 186; myriopoda, 186; pubescens, 185.
Microcladia borealis, 17.
Microstylis, 78; unifolia, 78, 83, 92.
Millegrana, 50; Radiola, 50.
Mimulus moschatus, 98.
Mitella nuda, 94.
Mitremyces, 197, 198; lutescens, 197; Ravenelii, 197.
Mnium spinulosum, 117.
Mollugo, 127.
Monostroma, 23–25; arctium, 24, 25, var. intestiniformis, 24; fuscum, 24, 25; Grevillei, 23–25, var. Vahlii, 24; Lactuca, 23–25; latissimum, 26; Notes on, 23; orbiculatum, 25, 26, forma **varians**, 26; pulchrum, 25; undulatum, 25.
Monotropa Hypopitys, 96, 154; uniflora, 96.
Monotropoideae, 153.
Monotropsis, 154; odorata, 153, Notes on, 153.
Montia fontana, 164.
Moore, A. H., A color Form of Carum Carvi, 178; Hairy-fruited Variations of Rhus Toxicodendron, 162; Status of Epilobium alpinum and Epilobium Hornemanni, 141.
Morphology of the Fruit of Lonicera caerulea, Note on the, 209.
Mosses, 176, 177.
Mount Greylock Region, Bryophytes of the,— IV, 116.
Mountain Cranberry, 177.
Musci, 117.
Mushroom Book, Another, 121.
Myosotis scorpioides, 98.
Myrica carolinensis, 231; Gale, 93.
Myriophyllum tenellum, 129.

Naias, 37.
Najadaceae, 205.
Najas, 37, 205; flexilis, 205, var. robusta, 205; gracillima, 205.
Nardia hyalina, 118.
Nasmythia articulata, 41.
Nemopanthes, 50.
Nemopanthus mucronata, 96.
Neottia, 106.
Nephroma arcticum, 100.
Neslia paniculata, 179.
New England Federation of Natural History Societies, 148; Hepaticae, Notes on,— VII, 185; A Juncus new to, 31; Key to the Species and principal Varieties of Cladonia occurring in, 212; Plants, Preliminary Lists of,— XXIII. Cladoniaceae, 215.
New Hampshire, Certain railroad Weeds of northern, 30; Cryptogramma Stelleri in, 64; Notes from Shelburne, 21; Scirpus lineatus in, 200; The Status of Arenaria stricta in, 184.
New Jersey, An interesting Addition to the Flora of, 121.
Newfoundland, Notes upon the Flora of, 85.
Nicandra physalodes, 56.
Nolina, 80, 81; **atopocarpa**, 81, 82; Brittoniana, 81, 82; georgiana 80–82; in the south Atlantic States, 80.
Nomenclatorial Changes in the Genus Corallorrhiza, Recent, 102.
Nomenclature in Trientalis and Rubus, Some Points of, 236.
North American Species of Barbarea, 134.

Note on Oxalis stricta, var. viridiflora, 118; on the Morphology of the Fruit of Lonicera caerulea, 209; on the Report of Scirpus nanus from Vermont, 84.
Notes from Shelburne, New Hampshire, 21; on Monostroma, 23; on Monotropsis odorata, 153; on New England Hepaticae,— VII, 185; on Plants of Chesterville, Maine, Additional, 30; on some Lichens from the Gaspé Peninsula, 100; on the Flora of lower Cape Cod, 125; upon the Flora of Newfoundland, 85.
Nowellia, 16.
Nymphaea advena, var. variegata, 93.
Nymphoides lacunosum, 129.

Occurrence of the Skunk Cabbage in an unusual Place, 63.
Octodiceras, 16.
Oenothera, 130; muricata, 130; serrulata, 199.
On the Nature of so called algal or boghead Coals, 61.
Onoclea sensibilis, 7, 176, 232; Struthiopteris, 86.
Onopordon, 60.
Ophrys corallorrhiza, 106.
Opuntia, 52.
Orchidaceae, 76, 102, 105, 179.
Orchids, 28.
Orchis, 79; spectabilis, 79.
Orobanche uniflora, 98.
Oryzopsis asperifolia, 88.
Osmorrhiza, 53.
Osmunda cinnamomea, 28, 87, 176, 231, 232, var. incisa, 28.
Osmundaceae, 36.
Oxalis, 119, 131; Brittonae, 50; Brittoniae, 50; corniculata, 131; filipes, 119; stricta, 118, 119, 131, 179, var. viridiflora, 118, 119, Note on, 118.
Oxycoccos, 61.
Oxycoccus, 61.

Panicum, 27; meridionale, 82; Werneri, 179.
Paracedroxylon, 172, A new Type of Araucarian Wood, 165; **scituatense**, 171.
Parnassia grandiflora, 46, 240; grandifolia, 240; parviflora, 94.
Pastinaca sativa, 127.
Pease, A. S., Certain railroad Weeds of northern New Hampshire, 30; Cryptogramma Stelleri in New Hampshire, 64; A Juncus new to New England, 31.
Pellaea atropurpurea, var. Bushii, 35; glabella, 35.
Pellia, 190, 191; calycina, 189; endiviaefolia, 190; epiphylla, 190, 191, forma Neesiana, 190; Fabroniana, 189–191; Neesiana, 190, 191.
Pelotes marines, 149.
Penhallow, D. P., An Account of certain noteworthy Features in the Habitat of Rhodora, 173.
Pentstemon laevigatus, 22.
Perilla frutescens, var. crispa, 55, var. nankinensis, 55.
Perkins, L. R., Viola pallens with pure white Petals, 164.
Phacelia, 54; bipinnatifida, var. brevistylis, 54; brevistylis, 54.
Phalangium virgatum, 80.
Phegopteris Dryopteris, 86; Phegopteris, 35; polypodioides, 86.
Phleum, 38.
Phryma Leptostachya, 7.
Phyllanthus, 50.
Physcia ciliaris, var. crinalis, 101; leucomela, 101.
Physostegia, 55.
Picea balsamea, 203; canadensis, 201; mariana, 201.
Pila, 63.
Pilophorus Cereolus, var. Fibula, 216.
Pimpinella Saxifraga, 53; Saxifragra, 53.
Pine, Pitch, 21, 22; Red, 21; White, 21.
Pinguicula vulgaris, 98.
Pink, 131.
Pinus, 170; Banksiana, 13; resinosa, 21; rigida, 21; Strobus, 21, 87; sylvestris, 163.
Pisum maritimum, 95, var. glabrum, 95.
Pitch Pine, 21, 22.
Pityoxylon, 168.
Placodium elegans, var. granulosa, 101, var. trachyphyllum, 101.
Plantago aristata, var. Nuttallii, 57, 131; decipiens, 229; media, 83.
Plants from the Vicinity of Wellesley, Massachusetts, Some rare, 82; new to Vermont, 198; of Chesterville, Maine, Additional Notes on, 30; Preliminary Lists of New England,— XXIII. Cladoniaceae, 215; some interesting Maine, 12; Two introduced, 120.
Plitt, C. C., Notes on Monotropsis odorata, 153.

Pluchea camphorata, 229.
Plum, Beach, 127, 132.
Poa alpina, 89; eminens, 7; trivialis, 89.
Podophyllum, 44.
Podostemon, 46.
Pogonatum, 16.
Pogonia, 79; ophioglossoides, 79, 92; verticillata, 79.
Polanisia, 45.
Polygala cruciata, 230.
Polygonella articulata, 30.
Polygonum arifolium, 7; exsertum, 121; Fowleri, 13; hydropiperoides, 230; Roberti, 93; sagittatum, 7; scandens, 7; viviparum, 93.
Polystichum acrostichoides, var. incisum, 35, 36, var. Schweinitzii, 35, 36; Braunii, 86.
Polytrichaceae, 16.
Polytrichum, 16.
Pontederia cordata, 129.
Porella, 16.
Portulaca, 44.
Posidonia, 150; Caulini, 150.
Potamogeton, 129, 206; americanus, 206; amplifolius, 206; angustifolius, 206; bupleuroides, 88, 206; crispus, 206; dimorphus, 206; epihydrus, 206; foliosus, 206; gemmiparus, 206; heterophyllus, 206, forma graminifolius, 206, forma longipedunculatus, 14, forma maximus, 14, 206, forma myriophyllus, 206; hybridus, 207; lateralis, 207; lucens, 207; mysticus, 207; natans, 207; × nitens, 207; Nuttalii, 37; Nuttallii, 37; Oakesianus, 207; obtusifolius, 207; pectinatus, 88; perfoliatus, 14; praelongus, 207; pulcher, 207; pusillus, 207, var. polyphyllus, 207, var. Sturrockii, 207, var. tenuissimus, 208; Robbinsii, 208; × spathaeformis, 208; strictifolius, 208; Vaseyi, 208; zosterifolius, 208.
Potentilla, 1, 127, 152, 153; Anserina, 1–3, 5, 6, 8, 47, 48, var. anserinoides, 5, var. argentea, 8, var. concolor, 5, 8, 9, 48, var. discolor, 8, var. Egedii, 2, 6, 9, var. grandis, 2, 7, 9, 48, var. groenlandica, 2, 7, 8, var. hirsuta, 2, 5, var. holosericea, 8, in eastern America, Representatives of, 1, var. maoria, 2, 5, var. nuda, 2, 5, var. sericea, 2, 5, 8, 48, var. unicolor, 8, var. vulgaris, 2, 3, 5, 8; anserinoides, 5; Argentina, 8; canadensis, 153; canescens, 47; concolor, 8; Egedii, 6, 9; inclinata, 47; litoralis, 7; Nuttallii, 47; pacifica, 7, 8, 47, 48; palustris, var. villosa, 48; pumila, 152, 153, A color Form of, 152, forma leucantha, 152, forma **ochroleuca**, 153; recta, 179; sericea, 8; verna, 153.
Preliminary Lists of New England Plants,—XXIII. Cladoniaceae, 215.
Prenanthes nana, 99; trifoliolata, 99.
Prepinus, 170.
Primrose, Evening, 199.
Primula farinosa, var. macropoda, 97; mistassinica, 97.
Proserpinaca palustris, 120, var. **amblyogona**, 120, An inland variety of, 120.
Prunus Gravesii, 49; Mahaleb, 49; maritima, 127.
Ptilimnium capillaceum, 226, 229.
Pubescent Variety of Aster dumosus, 31.
Pyrethrum inodorum, var. salinum, 239.
Pyrola americana, 96; chlorantha, 96; minor, 13, 96; secunda, var. obtusata, 96.
Pyrus americana, 94; arbutifolia, 47, var. atropurpurea, 94, 231, 232; melanocarpa, 94; sitchensis, 94.

Racomitrium, 16.
Radiola, 50; Linoides, 50.
Radula, 16.
Ranunculaceae, 130, 132.
Ranunculus repens, 93, 130.
Raphanus, 45.
Raspberry, 28, 236.
Recent nomenclatorial Changes in the Genus Corallorrhiza, 102.
Recognition of Corylus rostrata and Corylus americana, 107.
Red Alga, 17; Pine, 21.
Rehder, A., Note on the Morphology of Lonicera caerulea, 209.
Reinschia, 63.
Remarkable Form of Kalmia latifolia, 199.
Reports on the Flora of the Boston District,— IV, 75, V, 204.
Representatives of Potentilla Anserina in eastern America, 1.
Rhamnus alnifolia, 96.
Rhododendreae, 53.
Rhododendron canadense, 96; lapponicum, 97; viscosum, 231.
Rhodora, 173–177, Account of certain noteworthy Features in the Habitat of, 173.

Rhus, 163; Toxicodendron, 162, 163, 226, 230–232, Hairy-fruited Variations of, 162, forma **malacotrichocarpum**, 163; vernix, 231.
Rhynchosia reniformis, 50.
Rhynchospora. See Rynchospora.
Ribes americanum, 46; aureum, 46, 47; floridum, 46, 47; lacustre, 94; odoratum, 46, 47; oxyacanthoides, 94, 130, 231; prostratum, 94; triste, 94.
Riccardia sinuata, 118.
Ricciella, 16.
Riddle, L. W., Key to the Species and principal Varieties of Cladonia occurring in New England, 212; Notes on some Lichens from the Gaspé Peninsula, 100; Preliminary Lists of New England Plants,— XXIII. Cladoniaceae, 215.
Robinia Pseudo-Acacia, 128.
Robinson, B. L., Bartonia, 74; Emendations of the seventh Edition of Gray's Manual,— I, 33.
Rosa acicularis, var. Bourgeauiana, 14; virginiana, 95.
Rotala ramosior, 83.
Rubus, 27; alleghaniensis, var. calycosus, 179; americanus, 236; Chamaemorus, 94, 164; idaeus, 179, 236, var. aculeatissimus, 236, var. canadensis, 236; occidentalis, forma pallidus, 48, var. pallidus, 48; pubescens, 236, 237; saxatilis, var. canadensis, 237; Some Points of Nomenclature in, 236; strigosus, 236; triflorus, 236; villosus, var. humifusus, 130.
Rudbeckia, 130.
Rue, Meadow, 199.
Rumex mexicanus, 179; occidentalis, 164; pallidus, 13.
Ruppia, 208; maritima, 208.
Rupture of the Exoperidium in Calostoma Ravenelii, 197.
Rushes, 132.
Rynchospora, 40; alba, 90, 231.

Sabatia, 54; dodecandra, 129.
Saccogyna, 16.
Sagina nodosa, 13, 93, var. glandulosa, 13; procumbens, 93.
Sagittaria, 37; subulata, var. gracillima, 82.
Salicornia ambigua, 127, 229; europaea, 127, 229, var. prostrata, 93; mucronata, 127, 229.
Salix, 158; cordata, 9, 10; fuscescens, 159; myrtilloides, 157–159, 161, var. pedicellaris, 158, 160–162, subsp. S. pedicellaris, 161; pedicellaris, 157–162, and its Variations, 157, var. **hypoglauca**, 161, var. **tenuescens**, 162; pellita, 14; pensylvanica, 160; petiolaris, 10, 11, var. sericea, 11, var. subsericea, 11, 12; rostrata, 231; sericea, 9–11, var. subsericea, 11, 12; sericea × petiolaris, 11, 12; subsericea, 11, 12, 43, a distinct Species, 9; Uva-ursi, 93; vestita, 92.
Salsola Kali, 93, 121, var. tenuifolia, 30.
Sambucus racemosa, 98.
Saponaria officinalis, 127.
Sapotaceae, 54.
Sargent, C. S., American Crataegi in the Species Plantarum of Linnaeus, 181.
Saxifraga aizoides, 94.
Saxifragaceae, 130, 132.
Scandix, 53.
Scapania apiculata, 194; glaucocephala, 194; gracilis, 195; Peckii, 194.
Scheuchzeria, 208; palustris, 82, 208.
Schizaea pusilla, 86.
Schmaltzia, 163.
Scirpus, 200; americanus, 229, 230; atrocinctus, 89, var. brachypodus, 89; campestris, var. paludosus, 229; debilis, 220, var. Williamsii, 220; Hallii, 220; hudsonianus, 89; lineatus, 200, in New Hampshire, 200; nanus, 84, 89, from Vermont, Note on the Report of, 84; occidentalis, 89; Olneyi, var. contortus, 39; rubrotinctus, 89; rufus, 89; Smithii, 220, in Massachusetts, 220; subterminalis, 89.
Scrophularia nodosa, 98.
Scurvy Grass, 140.
Scutellaria galericulata, 98; lateriflora, 98.
Sedges, 132.
Sedum Fabaria, 46; purpureum, 46; roseum, 13; telephioides, 199; Telephium, 46, var. purpureum, 46; triphyllum, 46.
Selaginella selaginoides, 87.
Senecio aureus, 99; Balsamitae, 99, var. pauperculus, 99; vulgaris, 99.
Shad Bushes, 27.
Shelburne, New Hampshire, Notes from, 21.
Shepherdia canadensis, 96.

Silverweeds, 1, 48.
Sinnott, E. W., Paracedroxylon, a new Type of Araucarian Wood, 165.
Sisymbrium altissimum, 22, 130; Barbarea, 138; officinale, var. leiocarpum, 131.
Sisyrinchium, 76; angustifolium, 76, 92, 131; atlanticum, 76, 131; gramineum, 76, 179.
Skunk Cabbage, 63, 64, in an unusual Place, Occurrence of the, 63.
Smilacina stellata, 91, 131; trifolia, 91.
Smilax Bona-nox, 42; rotundifolia, 131, var. quadrangularis, 43.
Societies, The New England Federation of Natural History, 148.
Society, Meeting of the Josselyn Botanical, 179.
Sodium chloride by Spartina glabra alterniflora, Excretion of, 237.
Solidago, 130; altissima, var. procera, 57; hispida, 98; macrophylla, 98, var. thyrsoidea, 99; nemoralis, 130; odora, 130; sempervirens, 127, 130; tenuifolia, 130; uliginosa, 99; ulmifolia, 130; uniligulata, 99.
Solorina crocea, 101.
Sparganiaceae, 204.
Sparganium, 204; americanum, 204, var. androcladum, 204; angustifolium, 88, 204; diversifolium, 205, var. acaule, 205; eurycarpum, 205; fluctuans, 205; hyperboreum, 88; lucidum, 205, 220; minimum, 205; simplex, 13, 88.
Spartina glabra, 225, 226, var. alterniflora, 89, 237, Excretion of Sodium chloride by, 237, var. pilosa, 229; Michauxiana, 89, 230; patens, 225, 226, 229.
Species and principal Varieties of Cladonia occurring in New England, Key to the, 212; of Cladophora, New, 17.
Spergula, 132; arvensis, 93.
Spergularia canadensis, 229; rubra, 93.
Spermatophyta, 82.
Sphaerophorus fragile, 101.
Sphagnales, 16.
Sphagnum, 225, 230, 234; acutifolium, var. rubrum, 231; amblyphyllum, var. parvifolium, forma tenue, subforma capitatum, 231; cymbifolium, var. virescens, 231; dasyphyllum, 230; flavicomans, 232; imbricatum, var. affine, 232, var. cristatum, forma fuscescens, 231, 232; medium, var. purpurascens, 232; obesum, 230; pulchricomum, var. pulcherrimum, forma sphaerocephalum, 232.
Sphenolobus, 16; exsectus, 118; Hellerianus, 195; Michauxii, 118, 195; Peckii, 195.
Sphenopholis nitida, 83.
Spiraea latifolia, 129, 175, 176; tomentosa, 129.
Spiranthes, 79; Beckii, 79; cernua, 79, 200, var. ochroleuca, 79; gracilis, 79; graminea, var. Walteri, 80; intermedia, 79; lucida, 79; Romanzoffiana, 92; vernalis, 80
Spondiaceae, 163.
Spongomorpha, 19.
Spruce, Black, 175, 201; White, 201.
Stachys ambigua, 83.
Star-flower, 236.
Status of Arenaria stricta in New Hampshire, 184; of Epilobium alpinum and Epilobium Hornemanni, 141.
Stellaria borealis, 93; humifusa, 13, 93, 110, 164; media, 112, var. procera, 44.
Stephanina, 16.
Stereocaulon alpinum, 216; condensatum, 216; coralloides, 216; denudatum, 216; nanodes, 216; paschale, 216; pileatum, 216; tomentosum, 216.
Stone, G. E., A remarkable Form of Kalmia latifolia, 199.
Streptopus amplexifolius, 91; roseus, 91.
Stuartia, 51.
Suaeda, 120, 121.
Submarine Chamaecyparis Bog at Woods Hole, Massachusetts, 221.
Symphytum, 55.

Tanacetum vulgare, 127, var. crispum, 127.
Tansy, 127.
Taxodineae, 168.
Taxoxylon, 168.
Taxus, 168; canadensis, 87.
Teucrium, 148; Botrys, 55; new to Massachusetts, 148; occidentale, var. boreale, 148.
Thalictrum, 130; confine, 199; polygamum, var. hebecarpum, 93, 179.
Thamnolia vermicularis, 216.
Thistle, Canada, 130.
Thuya, 37.
Thylax, 63.
Tofieldia glutinosa, 91; palustris, 91.

Missouri Botanical Garden Library
3 1753 00341 3322

Tragopogon pratensis, 179.
Trientalis americana, 97, 236; borealis, 236; Europaea, 236, var. americana, 236; Some Points of Nomenclature in, 236.
Trifolium dubium, 131; pratense, 49; procumbens, 199.
Triglochin, 209; maritima, 209, 226, 229.
Tsuga, 167, 168.
Tubers on the Roots of Eleocharis interstincta and E. quadrangulata, 29.
Twigs, The Weight of ice-covered, 32.
Two introduced Plants, 120; new Species of Characium, 65.
Typha, 204; angustifolia, 179, 204; latifolia, 175, 204, 230.
Typhaceae, 204.

Ulva, 23; fasciata, 24; Grevillei, 23; Lactuca, 23.
Ulvaceae, 23, 25.
Utricularia cornuta, 98; intermedia, 98; vulgaris, var. americana, 98.

Vaccinium, 157; corymbosum, 232; macrocarpon, 97, 230, 231; ovalifolium, 97; Oxycoccos, 97, 240, var. intermedium, 54, var. ovalifolium, 54; pennsylvanicum, 97, var. angustifolium, 97, var. myrtilloides, 54; uliginosum, 97, 157; Vitis-idaea, var. minus, 177.
Valoniaceae, 20.
Variations of Arenaria peploides in America, 109.
Varieties of Cladonia occurring in New England, Key to the Species and principal, 212.
Variety of Abies balsamea, A new, 201; of Aster dumosus, A pubescent, 31.
Vegetable Matter from sandy Shores, On Balls of, 149.
Verbena hastata, 130.
Vermont Botanical and Bird Clubs, Annual Field Meeting, 124; Botanical Club, The winter Meeting of the, 27; Note on the Report of Scirpus nanus from, 84; Plants new to, 198.
Viburnum cassinoides, 98, 232; pauciflorum, 98.
Vicia angustifolia, 49; Cracca, 95, 178.
Viola Brittoniana, 14, 15, 107, 116, at Concord, Massachusetts, 107; **Brittoniana × lanceolata**, 15, 115; cucullata, 96, 115; **cucullata × primulifolia**, 115; emarginata, 115; fimbriatula, 131; incognita, 96; labradorica, 14, 96; lanceolata, 14, 15, 116; lavandulacea, 115, 116, novae-angliae, 14; pallens, 96, 164; with pure white Petals, 164, forma **alba**, 164; palmata, 107; primulifolia, 115, 116; Selkirkii, 96.
Violet, 14, 131; Another Hybrid between a white and a blue, 115; A new hybrid, 14.
Vitis, 51; labrusca, 129.

Weatherby, C. A., A color Form of Potentilla pumila, 152.
Weberaceae, 16.
Webster, H., Another Mushroom Book, 121.
Weed-balls, Water-rolled, 151.
Weeds of northern New Hampshire, Certain railroad, 30.
Weight of ice-covered Twigs, 32.
Wellesley, Massachusetts, Some rare Plants from the Vicinity of, 82.
White Cedar, 175; Pine, 21; Spruce, 201.
Wiegand, K. M., Lathyrus palustris, var. pilosus (Cham.) Ledeb. in Massachusetts, 108; Recognition of Corylus rostrata and Corylus americana, 107; Some rare Plants from the Vicinity of Wellesley, Massachusetts, 82; Tubers on the Roots of Eleocharis interstincta and E. quadrangulata, 29.
Wild Carrot, 128.
Willow, 9; Herb, 141.
Winter Cress, Early, 140; Meeting of the Vermont Botanical Club, 27.
Wisteria, 49.
Woods Hole, Massachusetts, The submarine Chamaecyparis Bog at, 221.
Woodsia obtusa, 86.
Woodwardia virginica, 28, 128.

Xanthium canadense, 220.
Xanthoxalis, 119.
Xyris caroliniana, 129; montana, 86, 91.

Zanichellia, 208; palustris, 208, var. pedunculata, 208.
Zigadenus, 42.
Zostera, 150, 208, 225; marina, 121, 208.
Zygadenus, 42.